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The Construction of Notre-Dame in Paris

Caroline Bruzelius

The chronology of construction at Notre-Dame in Paris has not been reconsidered since Marcel Aubert's monograph published early in this century. As the result of systematic measurements taken throughout the monument (including the upper levels of the interior), a revision of Aubert's building sequence is now possible. In particular, there is substantial evidence that the choir elevation was modified during construction; this modification probably included the addition of flying buttresses. The nave was begun while construction of the choir was still at the level of the tribunes, and the nave structure was designed from the outset in relation to the flying buttress. The upper levels of the north side of the nave were constructed before those on the south. Changes in moldings and other details in combination with larger modifications of the elevation permit the identification of five master masons between the inception of the work in ca. 1160 and the completion of the main body of the cathedral in ca. 1245.

The Cathedral of Paris is a monument of exceptional historic and artistic importance. Its vast scale reflects the dramatic growth of Paris in the twelfth century and the city's emergence not only as the major commercial and intellectual center north of the Alps, but also as the chief residence and administrative center of the kings of France.[1] Located on the east end of the Ile-de-la-Cité, the cathedral faced the royal palace across the island, and had a long and intimate association with the royal family.[2] The king and bishop shared jurisdiction over the city; their dual authority found metaphorical reflection in their separate but equal zones at either end of the island.

To its historical position must be added the importance of the cathedral in the history of Gothic architecture. Taller, longer, and wider than any Gothic church before it, Notre-Dame incorporated numerous technical and structural advances (Figs. 1 and 2). There we find the earliest example of the gigantism that was to become characteristic of Gothic architecture in the following generation of cathedrals. The four-story elevation with oculi in the third story was unique at the time of its design. In addition, the flying buttresses of the nave of Notre-Dame have been considered the first in Gothic architecture, the result of the utilization of thin-wall construction, which necessitated additional exterior support.[3]

Yet, with the exception of Marcel Aubert's monograph published in several editions early in this century, and a series of specialized studies that have concentrated variously on the sculptural decoration, the additions and modifications of the thirteenth century, and the flying but-

Research for this project was begun in 1983 with a grant from the American Council of Learned Societies, and continued during the summer of 1984 with a fellowship from the National Endowment for the Humanities. The Research Council of Duke University supported several short trips to Paris to work on the scaffolding erected for the cleaning of the interior. I would like to thank Bernard Fonquernie, *architecte en chef des monuments historiques*, and the staff at Notre-Dame for their kind assistance in giving me access to the scaffolding and to the upper stories of the cathedral. Research for this project has greatly benefited by discussions with William W. Clark, to whom I am also very grateful for several photographs and molding profiles. Special thanks are due Warren Wilson, who executed Figs. 15 and 31. In addition, I would like to thank Peter Fergusson, Edson Armi, Stephen Murray, and Kathryn Horste for reading drafts of the article; Dominique Vermand for sharing his work on the Cathedral of Senlis prior to publication; and Douglas Runté, now a Duke graduate, for working long and patiently as my assistant taking measurements. This article is dedicated to Vincent Scully.

[1] Robert-Henri Bautier, "Quand et comment Paris devint capitale," *Bulletin de la Société de l'Histoire de Paris et de l'Ile-de-France*, CV, 1978, 17-46, esp. 39ff; John W. Baldwin, *The Government of Philip Augustus: Foundations of French Royal Power in the Middle Ages*, Berkeley, Los Angeles, and London, 1986, 342-54; and Jacques Boussard, *Nouvelle histoire de Paris de la fin du siège de 885-886 à la mort de Philippe Auguste*, Paris, 1976, esp. 227-59.

[2] Louis VII on his departure for the Second Crusade in 1147 described the Cathedral of Notre-Dame as honored all the more because it was intimately tied to the Crown ("Parisiensem ecclesiam tanto propensius nos honorare debere recolimus quanto eam ex longo temporum usu corone regni familiarius adjunctam esse perpendimus"); see Bautier (as in n. 1), 40-41. When Philip Augustus left on crusade in 1190, he provided that the dean and chapter should oversee the construction of the cathedral should the bishop die, because Notre-Dame had won his special affection ("inter quas pre ceteres Parisiensem ecclesiam familiarius et affectuosius diligentes, precepimus . . ."); see Guérard, II, 402.

[3] For example, Jean Bony, *French Gothic Architecture of the 12th and 13th Centuries*, Berkeley, Los Angeles, London, 1983, 179-83.

tresses, few scholars have devoted themselves to the monument as a whole.[4] The specialized studies have added greatly to our understanding of specific aspects of the monument; however, the chronology adopted is commonly that of Aubert, even though he described his work as preliminary.[5] Aubert's dating has thus acquired a canonic quality, and a number of problems in the chronology of the monument have been obscured or oversimplified. As I shall argue, Notre-Dame was not a church erected in a neat progression from east to west, with each segment completed before the inception of the next; instead, work was often undertaken in several widely separated parts of the building simultaneously. There was thus a process of what we might call statement and response, not only in subtle details but also in the larger design along the length of the church during the course of its construction. This internal dialectic needs to be described and understood. It is essential not only for our understanding of the elevations of the choir, nave, and façade of Notre-Dame itself, but also for the history of Gothic architecture, as the location and scale of this monument made it one of the most visible and influential buildings in twelfth- and thirteenth-century France.[6]

The revised chronology I present here is the result of systematic measurements and molding profiles taken throughout the church. I shall not take issue with the traditional date of the inception of the work in ca. 1163, nor with the date of its completion in ca. 1250, for both of which there is much good evidence,[7] but I shall present a considerable modification of the view of building phases within those parameters, especially as regards the construction of the upper stories of both choir and nave. I propose that the nave was well underway while the upper stories of the choir were being completed, and that the design of the choir was modified in the upper stories. These modifications probably included the addition of flying buttresses, the full implications of which were then utilized in the design of the nave. This conclusion in particular resolves a conflict between the widely accepted theory that flying buttresses were invented in the nave of Notre-Dame and the evidence that flyers existed in a number of earlier monuments. In addition, I argue that the upper wall of the north side of the nave was constructed before the south. Work began on the north corner of the west façade while the main arcade supports of the nave were under construction, but the original façade design was subsequently modified. Construction of the west façade was interrupted at the top of the rose level for ten to twelve years while the vaults were completed, the clerestory windows and flying buttresses were rebuilt, and several chapels were inserted between the buttresses on the north side of the nave. Finally, I propose that certain aspects of the choir elevation as it was first designed situate the Cathedral of Paris more securely in a context that is local to the Ile-de-France — and perhaps specifically Capetian.

The numerous additions and modifications to the original fabric have made the study of the construction campaigns difficult.[8] The outer wall structure in the aisle and ambulatory was obliterated in the thirteenth century by the addition of chapels between the buttresses, and the wall at clerestory level was reworked when the clerestory windows were enlarged and the flying buttresses were modified. In the lower parts of the building, however, the masonry

[4] Aubert, 1909; *idem*, 1920; and *idem*, *Notre-Dame de Paris, architecture et sculpture*, Paris, 1928. Robert Branner also contributed many important insights into the construction and chronology of the cathedral in his article on the beginning of Rayonnant architecture, 1962, 39-54. For a recent study of the chronology of the lower story of the choir, see Clark, 1985, and for general discussions, see Salet, 89-113; Bony (as in n. 3), 137-41; and Kimpel and Suckale, 148-62. On the sculptural decoration, see Sauerländer, 1-56; D. Jalabert, "La première flore gothique aux chapiteaux de Notre-Dame de Paris," *Gazette des beaux-arts*, v, 1931, 283-304; J. Thirion, "Les plus anciennes sculptures de Notre-Dame de Paris," *Comptes-rendus de l'Académie des Inscriptions et Belles-Lettres*, 1970, 85-112; A. Erlande-Brandenbourg, *Les sculptures de Notre-Dame de Paris au Musée de Cluny*, Paris, 1982; Clark and Ludden, 109-18; and K. Horste, "A Child is Born: The Iconography of the Portail Ste.-Anne at Paris," *Art Bulletin*, LXIX, 1987, 187-210. I would like to thank Kathryn Horste for allowing me to read her article in manuscript. For the additions and modifications of the 13th century, see Kraus, 121-34, and 1970, 271; Kimpel; M. Lasalle, "Les fenêtres des chapelles de la nef de Notre-Dame de Paris," *Information d'histoire de l'art*, XVII, 1972, 28-32. Finally, for the most recent discussion and bibliography on the question of flying buttresses, see Clark and Mark, 47-65.

[5] Aubert, 1920, 5. The absence of a synthetic study is probably the result of the formidable difficulties caused by the modifications to the church begun even while construction was still in progress, for which see n. 4 above. In addition, the restoration and reinterpretation of Notre-Dame by Viollet-le-Duc and Lassus in the mid-19th century obliterated or modified a large number of details (A. Erlande-Brandenbourg, "La restauration de Notre-Dame de Paris au XIXe siècle," *Archéologia*, no. 141, April, 1980, 26-31; P.-M. Auzas, "Viollet-le-Duc et la restauration de Notre-Dame de Paris," *Actes du Colloque International Viollet-le-Duc, Paris, 1980*, ed. P.M. Auzas, Paris, 1982, 177-84; Lausanne, Musée Historique de l'Ancien Évêché, *Viollet-le-Duc, Centenaire de la mort à Lausanne*, Lausanne, 1979, nos. 11-15; and Paris, Galeries Nationales du Grand Palais, *Viollet-le-Duc*, Paris, 1980, 72-81, 156-63. Extensive material survives in the Archives Nationales in the dossiers F19). In the choir in particular there are also many indications of structural problems that were repaired in the late 13th and early 14th centuries, and again, often radically, in the 19th century. These appear in the first intermediate piers on either side of the choir and the second arcade pier from the west on the south side (O10, R10, and Q11 on the plan, Figs. 2 and 4, a). One of these supports, O10, underwent several successive reconstructions. The anomalous flying buttress on the north side of the choir next to the north transept terminal may also have been an attempt to reinforce this part of the building. The structural problems are confined to the westernmost choir bays and may have resulted in part from the greater width of this last bay. The instability of the building here may also reflect the possibility that a transept was not intended in the original setting-out of the choir (see n. 23 below).

[6] The lavish scale of the monument is most striking if its dimensions are compared to those of the contemporary cathedral at Laon. Total length: Laon 90m, Paris 122m; height to the vaults at Laon 24m, Paris 32.50m. In addition to its scale, the materials were of the highest quality, as Viollet-le-Duc pointed out (the "luxe de matériaux très exceptionnel," VII, 123). It should be noted, however, that at tribune level and above in the choir the stone is of decidedly inferior quality to that utilized below or in the nave to the west. Some of this inferior limestone is part of the 19th-century restorations, but most is original.

[7] The dating of the monument will be discussed below. For the most recent review of the history of the earlier buildings, see Salet, 89-113.

[8] See nn. 4 and 5 above on these additions and modifications.

coursing can be reconstructed through measurements of the masonry beds in the aisle responds.[9] These measurements have been correlated with the dimensions of all the plinths on the arcade and gallery levels, the circumferences of the cylindrical supports, the profiles of the bases, the shapes and profiles of the abaci and other moldings, and the sculptural decoration of the capitals. The scaffolding erected for the cleaning of the interior begun in 1982 has made it possible to examine details in the upper levels of the elevation that would normally not be accessible.[10] The measurements and profiles taken throughout the monument permit a number of new observations on the building of the cathedral, though on occasion the state of the evidence is such that some of my conclusions must remain conjectural.

Certain methodological issues should be clarified from the outset. As regards base profiles and other moldings, the evidence suggests that the variations in types of profile often depended on their location in the building — i.e., the design of a base was frequently conceived in relation to the element it supports.[11] Changes in base profiles, especially when they appear in a systematic fashion, as in the choir of the cathedral, do not therefore denote a change in the master mason or workshop. I shall also argue against overinterpretation of the styles of the capitals. Not only was the workshop at Notre-Dame considerably expanded during the first decade of construction, but changes in style may also have been motivated more by the search for an idiom appropriate to the new monumental dimensions of the cylindrical supports than by a change in the leadership of the workshop. In certain parts of the building (the eastern bays of the south aisle, for example), there is clear evidence of experimentation in base types, with different profiles used for transverse and diagonal elements (Fig. 21, a, at S7 and S3). In my analysis of the construction of the nave arcade on both north and south, I speculate that there, at least for a brief period of time, two groups of masons might have been employed simultaneously.

My approach to the analysis of architectural detail may initially seem to exclude a discussion of the architects or master masons at the cathedral, who have traditionally been identified on the basis of molding and base profiles. On the contrary, this kind of evidence in combination with changes in the design of the elevation has led to the hypothesis that five master builders were employed at the site from the inception of the work in ca. 1160 to the appearance of Jean de Chelles in the mid-thirteenth century.[12]

A few comments should be made about certain important though unverifiable aspects of the building process. As in any large-scale monument, devices for raising the stone must have played a vital role in the sequence of construction. Work was therefore often completed in certain sectors because of the proximity of cranes or wheels that were positioned to serve the needs of construction as efficiently as possible. But what was construed as efficient as well as structurally sound may have varied from master to master, and was also surely the result of agreements reached between the master mason and the master carpenter.[13] Work on the upper stories took place in different sequences in various parts of the building, depending on the particular character of each building segment.[14] Though the entire apparatus of scaffolding, centering, and lifting devices is lost, the construction sequence as revealed by the masonry fabric does at least provide certain hints as to where some of these elements might have been positioned. The genius of the builders of Notre-Dame resided as much in the work of the master carpenter's temporary accoutrements of cranes, scaffolding, and centering as in the more permanent stone structure of the master mason. This was especially important at Notre-Dame because of the vast increase in the scale and complexity of the monument compared to those preceding it, features that deeply impressed both admirers and critics in the twelfth century.[15]

[9] Measurements of the peripheral walls have been taken up to a height of about two meters. For the masonry coursing in the choir, see Fig. 6.

[10] Work on the scaffolding also revealed a number of mason's marks in the upper walls of the nave on the north side, as well as substantial traces of the medieval painted decoration.

[11] Similar observations have been made by Jean-Pierre Ravaux in his study of Reims Cathedral, "Les campagnes de construction de la cathédrale de Reims au XIII siècle," *Bulletin monumental*, CXXXVII, 1979, 18.

[12] It has previously been thought that there were three masters in charge of the construction of the main body of the cathedral, neatly divided between the choir, nave, and façade (Branner, 1962, 39-41).

[13] The names of two of these figures survive from charters: a *Ricardus cementarius* appears as a witness in a charter of 1164, and a *Symon carpentarius* acts as a witness in 1170 and again in 1187 (Guérard, I, 47, 49, and 72). It is impossible to ascertain whether these were the master mason and carpenter, or indeed whether either was actually employed in the continuing construction at the cathedral.

[14] For example, as will be described below in detail, construction of the choir proceeded clockwise from north to south at gallery level (and presumably also at the level of the oculi and the clerestory windows), whereas in the nave the upper stories on either side were constructed separately. Also see my discussion of the façade and Fig. 31.

[15] The continuation to Sigebert states, "Ecclesiam beatissime Dei genitricis Marie, in qua ipse residet episcopus, propriis magis sumptibus quam alienis, decentissimo et sumptuoso opere renovavit" (V. Mortet and P. Deschamps, *Recueil de textes relatifs à l'histoire de l'architecture et à la condition des architectes en France au Moyen Age, XIIe-XIIIe siècles*, Paris, 1929, 111); and Robert de Torigni, "Quod opus si perfectum fuerit, non erit opus citra montes, cui apte debeat comparari" (*Chronique de Robert de Torigni, abbé du Mont-Saint-Michel, suivie de divers opuscules historiques de cet Auteur et de plusiers Religieux de la même Abbaye*, ed. L. Delisle, Rouen, 1873, II, 68). But at the same time, Pierre le Chantre, cantor of the Notre-Dame cathedral chapter, was criticizing excessive height and luxury in church building. See Mortet, 1888, 63ff, and J.W. Baldwin, *Masters, Princes, and Merchants: The Social Views of Peter the Chanter and His Circle*, Princeton, 1970, I, 66-70.

The Arcade Level of the Choir

The evidence indicates that construction of the choir[16] took place from the outside in (Fig. 3).[17] There is a process of increasing systematization and stabilization of structural elements, masonry coursing, and decorative detail from the earliest phases of construction in the turning bays of the peripheral wall to the supports of the main arcade on the interior.

At first glance, the base profiles might seem to participate in this process, as they can be divided into three groups corresponding to their location in the concentric rings of the choir plan (Fig. 5, a-c). The bases under the responds of the peripheral wall (Fig. 5, a) are similar (but not identical) to the recently discovered bases from an early version of the west portal scheme found re-used in the foundations of the nave.[18] The bases underneath the intermediate ambulatory supports (Fig. 5, b) are larger and more loosely conceived: the cavet is more open and the lower torus is much more horizontal. These bases can in turn be distinguished from the choir arcade bases, where the profiles appear neater and more compact (Fig. 5, c).

But the usefulness of these bases as a chronological index is questionable, as it is clear that their forms were conceived in relation to the elements they support, i.e., free-standing columns as opposed to responds along the peripheral wall. The bases of the choir peripheral wall are closest in profile to those of the choir tribunes on both the outer wall and the inner arcade (Fig. 5, d), even though the construction of the ambulatory and choir arcade columns obviously intervened. Indeed, the bases of the tribune must be five to ten years in date after their counterparts in the choir ambulatory below.

The construction of the enclosing wall can be divided into a series of phases on the basis of measurements of the plinths and the masonry coursing in the surviving twelfth-century responds.[19] These are schematically represented in Figure 6, in which the dark lines represent the heights of the masonry beds against a metric grid. The plinths on axis (E and H) and on the north side of the hemicycle (B) are higher and narrower than those attached to the southernmost hemicycle respond (K). The latter is closest in its dimensions to the somewhat uneven plinth heights down the south side of the choir (S14 through S10). The masonry suggests that the turning bays were constructed from the north to the south,[20] starting perhaps at point A or B, with the south side from S14 through S10 following the hemicycle peripheral wall. The construction of the hemicycle and south walls is irregular (Fig. 6), the coursing of the hemicycle so much so that it is likely that radiating chapels existed around the periphery.[21] The masonry of the north wall of the choir is, in contrast, very even, and was probably constructed last, in one smooth building phase from N10 through N14, with N14 functioning as the juncture between the hemicycle and the straight walls of the north side of the choir.[22]

The westernmost responds of the choir, which fold out onto the transept on either side, were constructed separately from the walls to the east (Figs. 3, b, and 6). This observation may confirm Viollet-le-Duc's statement in the *Dictionnaire* that no transept was originally intended at Notre-Dame.[23] The design of the plinth at the juncture with the transept on the north side indicates that it was constructed independently of that on the south (Fig. 7, a and b at N9 and S9); its similarity to the plinth design (though not the proportions) on the west side of the south transept arm and along the south side of the nave (Fig. 7, c, d) sug-

[16] The term choir is used here to refer to the entire area east of the transept, which at Notre-Dame contains the liturgical choir of the canons in the straight bays east of the crossing.

[17] There is much evidence to suggest that this was standard operating procedure in large-scale Gothic construction; the erection of the peripheral walls first enclosed the construction site and established its perimeter. It also often permitted the old church within the walls of the new to be used for as long as possible. See, for example, Charles Seymour, *Notre-Dame of Noyon in the Twelfth Century*, New Haven, 1939, 50.

[18] On these bases, see M. Fleury, "Découvertes à Notre-Dame de Paris," *Archéologia*, no. 183, 1983, 14-15; Clark, 1985, 41; and Clark and Ludden, 115, and n. 35.

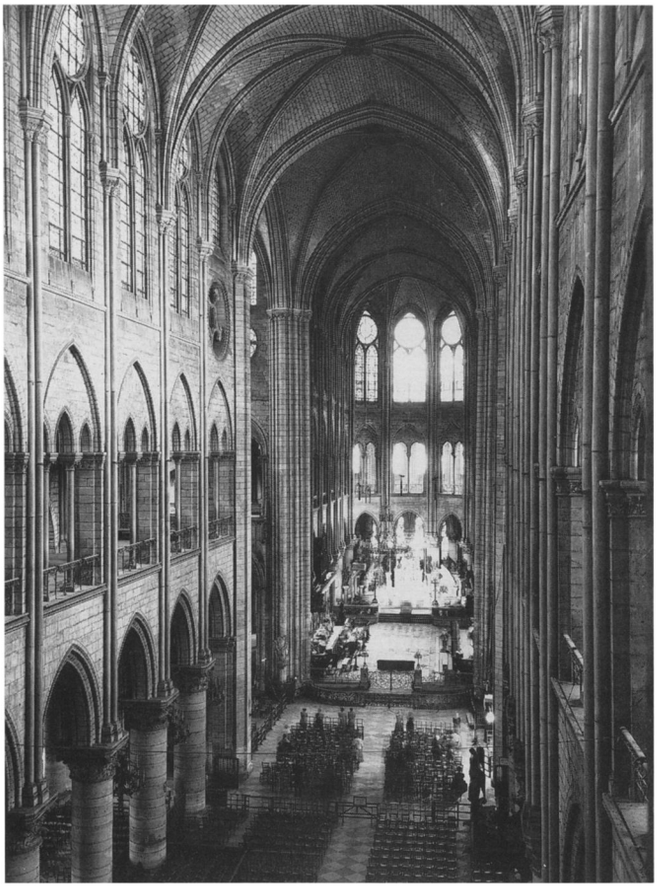
[19] These construction phases correspond to those suggested by Clark, 1985, *passim*, in his analysis of the capitals, though I disagree with his sequence for the construction of the choir straight walls and his early date for the inception of the work. See below, n. 26.

[20] The plinths at points B, E, and H all measure between 58.5 and 59.5cm in height, and the central respond is between 71 and 72cm wide. At K, the plinth is slightly lower (56cm) and wider (73cm). The straight bays on the south side are also irregular: plinths vary in height from 50.5 to 54.5cm, and the masonry coursing suggests the construction of short segments of wall, as in the turning bays.

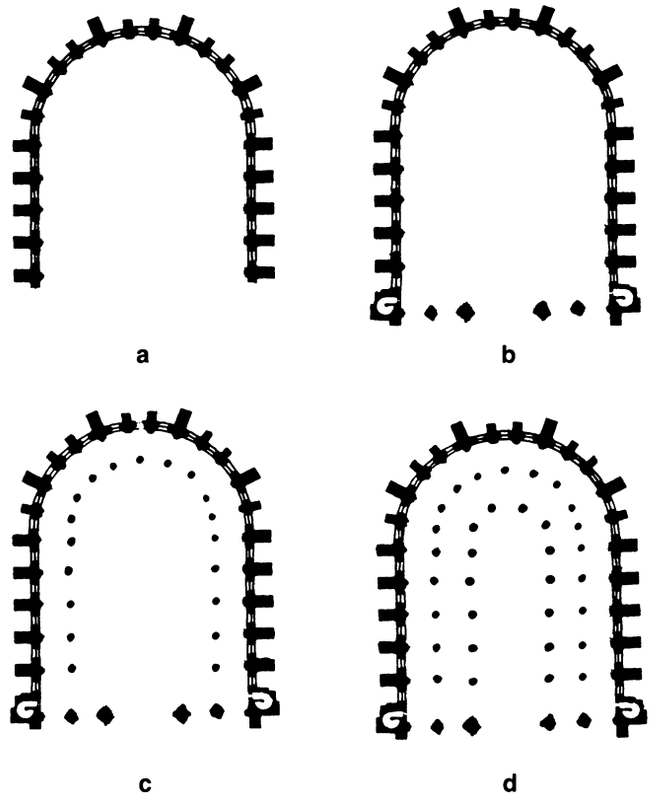
[21] Viollet-le-Duc, in "Entretien et restauration des Cathédrales de France. Notre Dame de Paris," *Revue générale de l'architecture et des travaux publiés*, IX, 1851, 9, suggested the possibility of niche-like radiating chapels at Notre Dame like those at Bourges, which, if they existed, might account for some of the irregularity in the masonry coursing of the hemicycle wall. See Viollet-le-Duc's plan in his *Dictionnaire*, II, 287. On the basis of an analysis of the masonry similar to mine, Kimpel and Suckale, 152, have come to the same conclusions.

[22] The Porte Rouge of the mid-13th century was the traditional entrance for the canons, and is located in bay N11-12. It may have replaced an earlier entrance at this location (see Kimpel, 86-91). The later completion of the north side is probably related to the location of the chapter buildings. The south side faced the bishop's palace, which was under construction at the same time as the cathedral. In 1170 a document referred to the bishop's new chapel, and between 1168 and 1176 an important meeting took place in the "domo nova episcopi" (Mortet, 1888, 73-77). The reconstruction of the bishop's palace may have been related to the earlier date of completion of the south side of the choir. On the north, the more complex situation of the chapter buildings is perhaps suggested by the destruction of a house belonging to Guillaume de Perche, for the construction of the cathedral is cited in the documents of the cathedral published by Guérard, IV, 18: "Quando autem predicta domus Galeranni, que juxta ecclesiam Beate Marie sita erat, diruta fuit pro reparatione ecclesie. . . ." The mention of this house appears in the obituary and is therefore not dated (the house may in fact have been destroyed for the construction of the nave); we know that Guillaume II du Perche, who became Bishop of Châlons-sur-Marne in 1215, died on 18 Feb. 1226 (J.-P. Ravaux, "La cathédrale gothique de Châlons-sur-Marne," *Mémoires de la Société d'Agriculture, Commerce, Sciences et Arts du Département de la Marne*, XCI, 1976, 712-13; and *Gallia Christiana*, IX, col. 887).

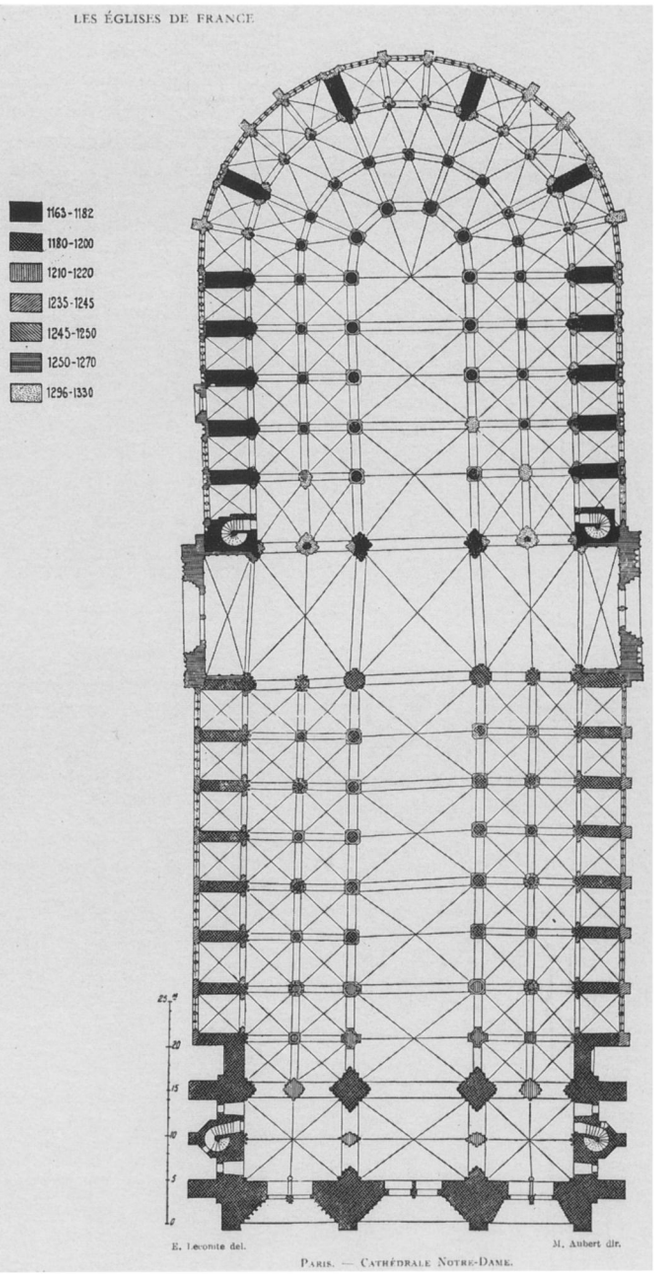
[23] Viollet-le-Duc, IX, 222: "Nous en avons acquis la preuve dans les fondations et au-dessus des voûtes de la croisée. Très-probablement on ne se décida, à Paris, à donner un transsept [sic] à la cathédrale qu'après l'achèvement du choeur, c'est-à-dire après la mort de Maurice de Sully."



1 View of the interior of Notre Dame from the west (photo: Arch. Phot. Paris/S.P.A.D.E.M.)



3 Phases of construction of the choir (unless otherwise noted, all figures are of Notre-Dame and are by the author)



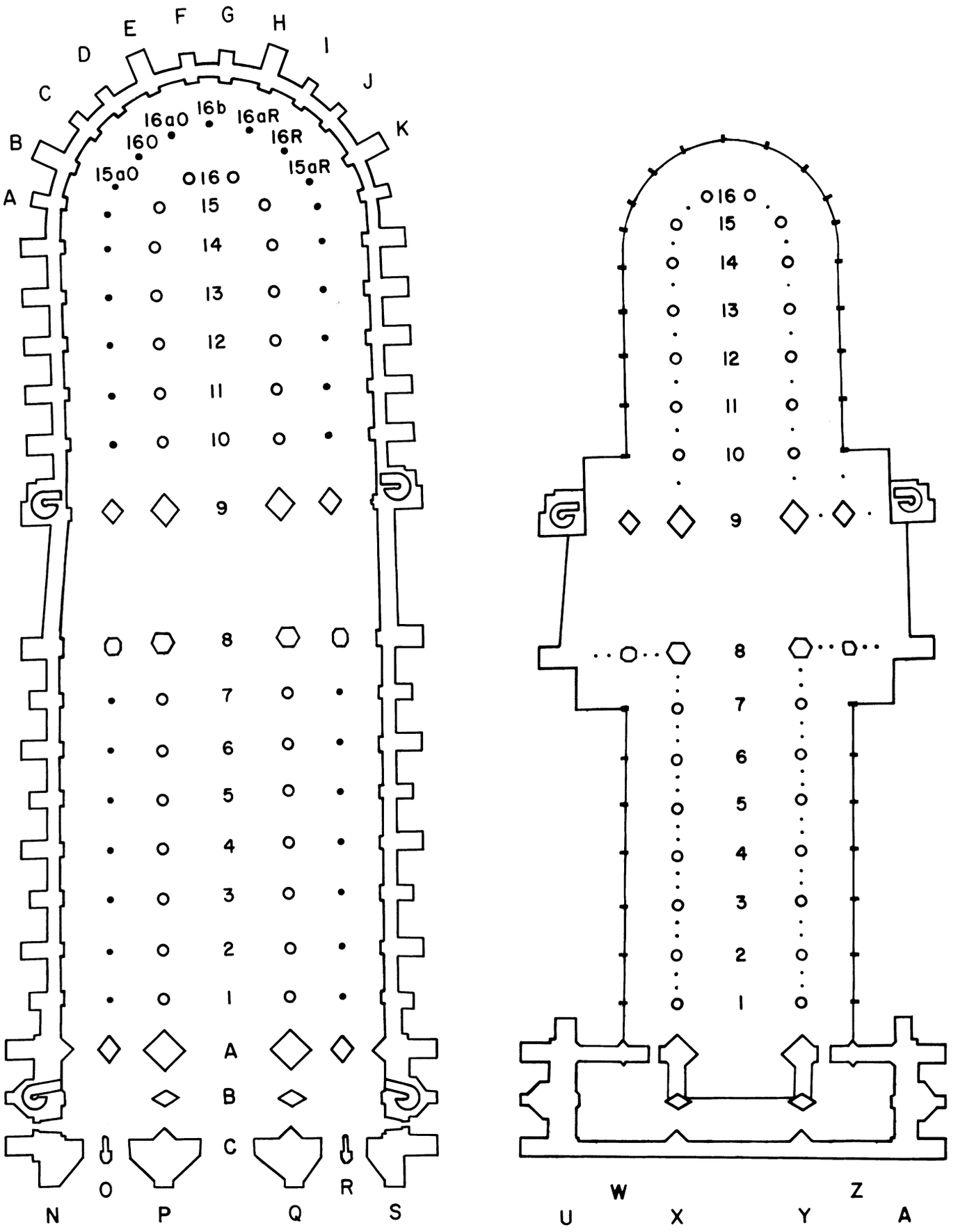
2 Plan, after Aubert, 1920

gests that it may have been later in date than the corresponding element on the south side. In any case, these variations in plinth types within the transept indicate that it was built in several different phases, each relatively independent of the work on the choir to the east or the nave to the west (Figs. 6, 7, b, c).[24]

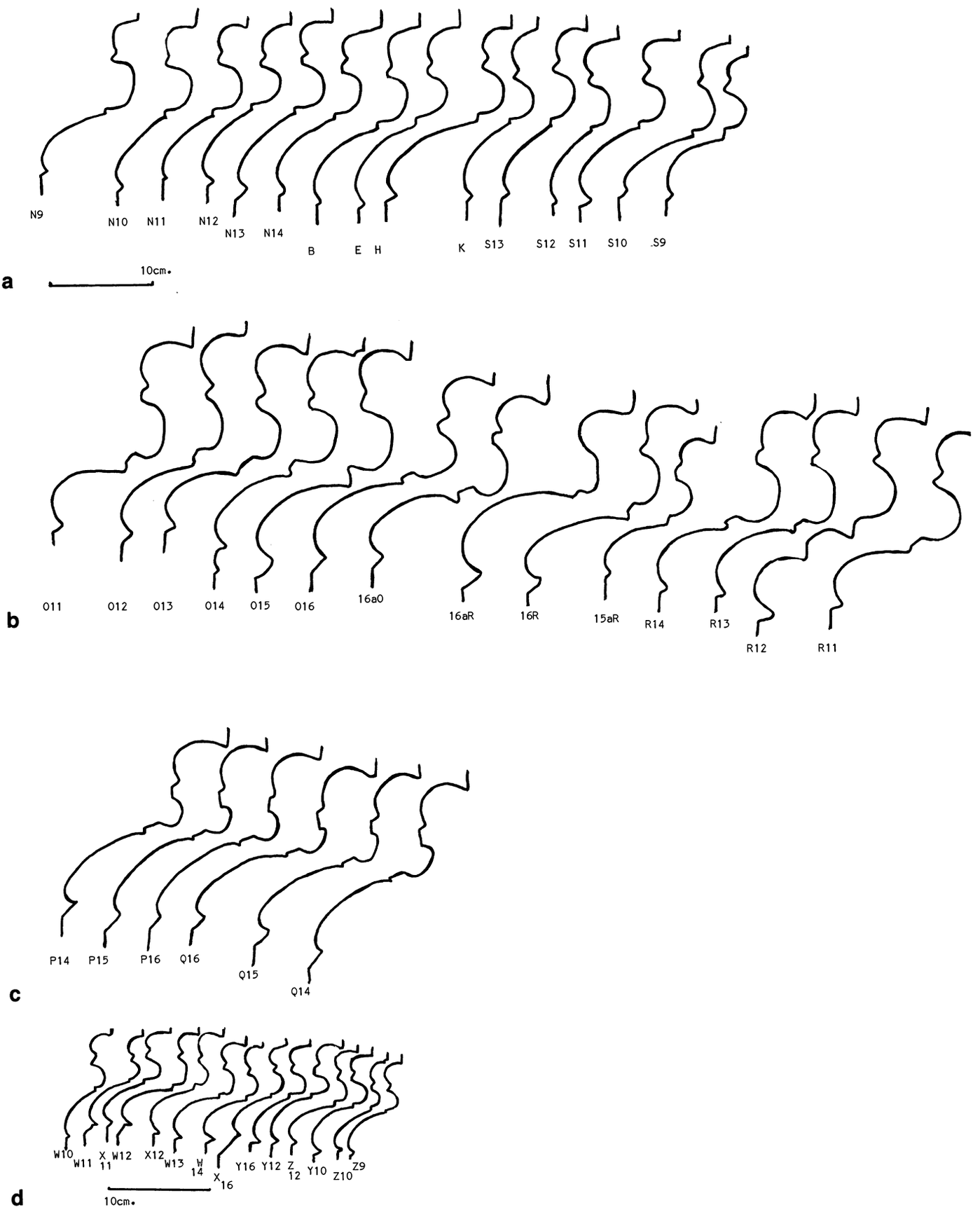
If a transept was not part of the original design, as Viollet-le-Duc suggested, but inserted while construction was in progress, it must, nonetheless, have been decided upon early in the building process.[25] The base profiles are close

[24] Nothing further can be said about the transept terminals, which were entirely replaced in the 13th century. Viollet-le-Duc, VIII, 40, and IX, 418-20, states that he discovered fragments of a large transept rose from the south side, which he dated ca. 1180.

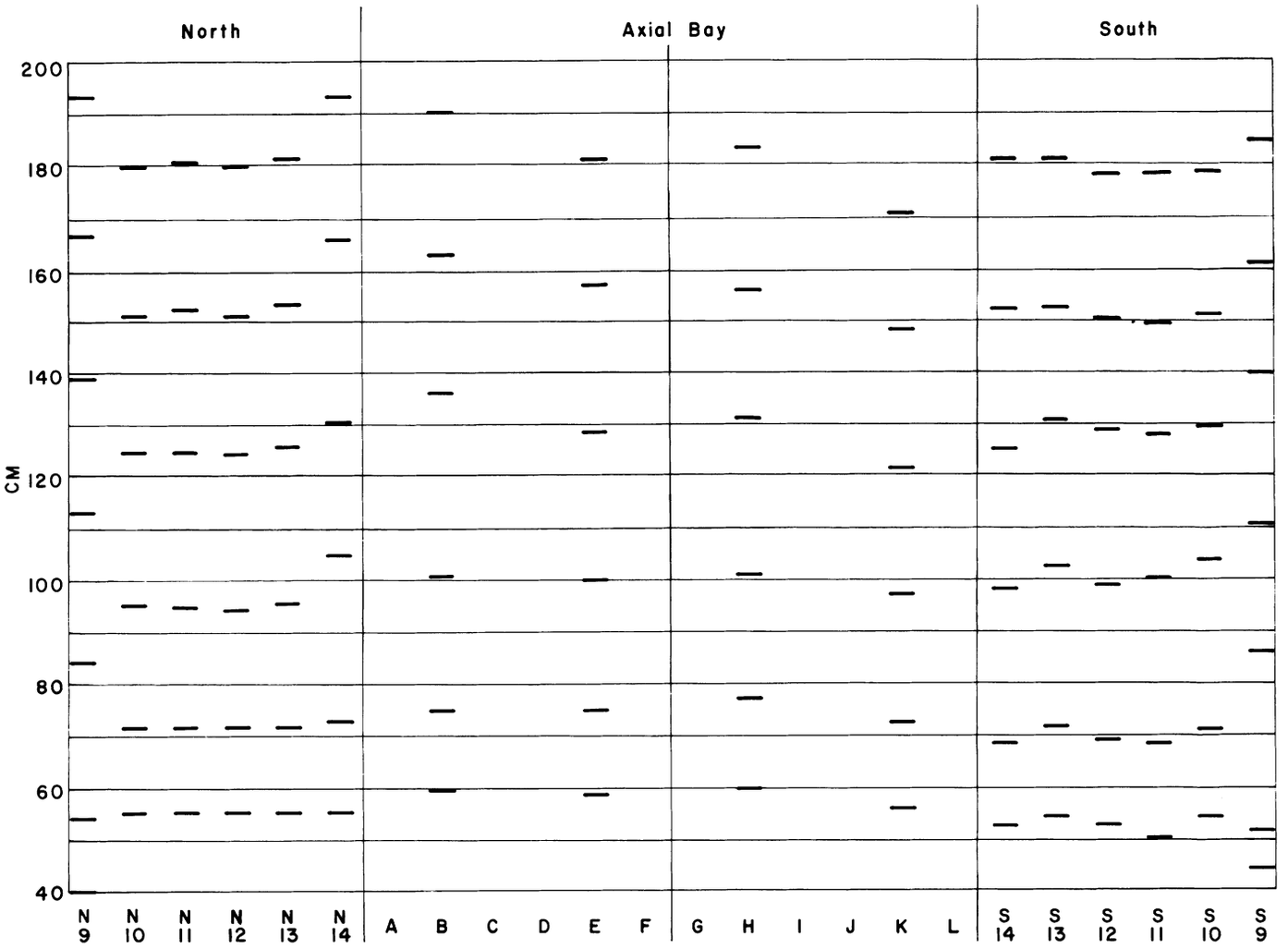
[25] Cf. Viollet-le-Duc, in n. 23 above.



4 Diagram of columns, pier, and respond locations: **a.** arcade level; **b.** gallery level



5 Base profiles in the choir: **a.** ambulatory responds; **b.** intermediate ambulatory supports; **c.** main hemicycle supports; **d.** choir tribune



6 Masonry coursing in choir wall at responds

to their companions to the east (Fig. 5, a, at N9 and S9), and some of the capitals, while not identical, correspond closely to those in the hemicycle peripheral wall.

The construction sequence suggested by the masonry coursing and the plinth dimensions is confirmed by other details, especially the character of the capitals. William Clark has recently demonstrated that the capitals in the peripheral wall are the earliest in the choir, and that those in the hemicycle preceded those in the straight bays, with the ones at N14 and A earliest in date (Fig. 8).[26] Hypothesizing a clear-cut building sequence based on the capitals alone is precarious, however, as they may have been carved in large numbers in the lodge in advance of the erection of the walls below: as long as the respond shafts were consistent in diameter, the capitals could be placed in almost any location. The earliest capitals, those of the turning bays, correspond to the areas in the enclosing wall where the masonry coursing is most uneven. The earliest phase of construction — the hemicycle — seems to have consisted of short segments of wall, and entailed the cutting of more pieces of stone whose shape was specific to a particular part of the wall structure.[27] Only in the straight bays on the north are there long stretches of wall constructed in a systematic fashion with regular masonry coursing (Fig. 6). The placing of the capitals in these straight bays may have been delayed until the entire length of wall was complete (for example, at S13, Fig. 9), whereas in the hemicycle the capitals were probably carved and set in place in conjunction with the construction of each respond. The surviving masonry of the choir reveals a process of increasing systematization of construction as work progressed from the north side of the hemicycle around to the straight bays of the south side, and then finally to the north side. It is important to note, however, that, in spite of the increasing refinement (and acceleration?) of the building process, the construction of the entire peripheral wall took place rapidly and without interruption.

Once the outer wall, including the juncture with the tran-

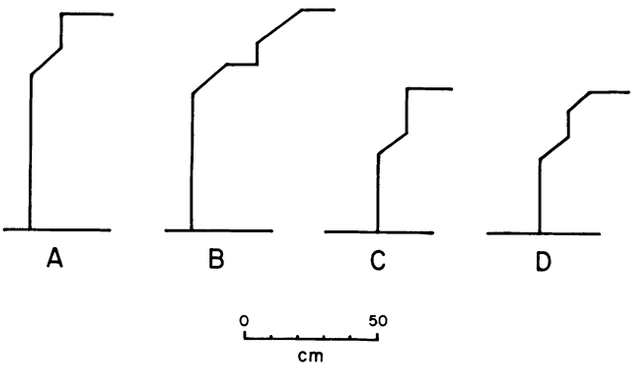
[26] Clark, 1985, 35. The positioning of the capitals need not necessarily have followed immediately the construction of the walls below.

[27] The most interesting analysis of wall construction is that of D. Kimpel, "Le développement de la taille en série dans l'architecture médiévale et son rôle dans l'histoire économique," *Bulletin monumental*, CXXXV, 1977, 195-222.

sept, was set in place, the intermediate ambulatory supports were erected (Fig. 3, c). With the exception of the anomalous columns at the juncture of the turning bays and the straight bays (15aO, 15aR), there is remarkable consistency in the dimensions of the plinths and the diameters of the columns.[28] The much narrower dimensions of these supports, their slightly smaller-scaled bases (Fig. 5, b at 15aR), and the adoption of plinths and abaci without chamfers all suggest that these two columns were designed and constructed in response to their particular location in the slightly awkward transition from the quadripartite vaulting of the straight bays and the quinquepartite vaulting of the hemicycle. Indeed, this pair of columns could be seen as self-consciously marking the juncture of these two parts of the choir, though their narrower dimensions are probably the function of the smaller bay dimensions in this location.

Some observations can be made on the basis of the measurements of plinths and the circumferences of the columns.[29] The circumferences suggest that possibly the first columns to be erected, 16R and 16aR (the last turning bays of the hemicycle on the south side), were smaller in diameter, with a circumference of 2.83cm.[30] In the straight bays on both sides, the columns are slightly larger, averaging about 2.86cm, with a tendency to taper slightly as they rise. The dimensions of the plinths and the diameters of the intermediate ambulatory supports may indicate that, while the plinths on the north side and hemicycle may have been set out before those on the south side, the erection of the columns on both north and south occurred simultaneously.

The choir screen conceals most of the main arcade in the straight bays, thus preventing an analysis of its construction.[31] The base profiles are as neat and tidy and precisely defined as those under the intermediate ambulatory supports are loose and open (Fig. 5, b, c). At the same time, the capitals are conceived with broader, more monumental forms that correspond to the massive dimensions of the columns below; there is much less undercutting and therefore less sense of three-dimensionality (compare Figs. 10 and 11). There is, however, considerable variety in the capitals of the intermediate ambulatory and choir arcade columns, suggesting that a large number of sculptors were now employed at the site. This is in contrast to the consistency of the capitals that survive in the turning bays of the peripheral wall, which indicates a smaller, more homogeneous workshop. This was inherited from the Abbey of St.-Germain-des-Prés, and worked in a traditional Parisian style (Fig. 8).[32] Although it is impossible, for reasons already mentioned, to organize the choir capitals as a whole into a convincing sequence, the capital styles nonetheless permit some observations on the sequence of the work and the character of the workshop:



7 Plinths: **a.** north transept, east side (N9); **b.** south transept east side (S9); **c.** south transept, west side (S8); **d.** nave, south side (S7)

(1) The sculptors of the earliest capitals above the peripheral wall responds in the turning bays came from St.-Germain-des-Prés, as Clark has suggested (Fig. 8). But the original small workshop of capital carvers was expanded dramatically with a large number of sculptors working in independent traditions when construction moved to the straight peripheral walls and intermediate ambulatory supports of the choir (Figs. 9 and 10). This may reflect a large infusion of funds in the early 1160s.

(2) The crossing piers were constructed immediately after the enclosing peripheral walls, given that their capitals at arcade level are like those above the responds in the north and south straight bays of the peripheral wall (Fig. 3, b). This would mean that the western termination of the choir was established before work proceeded on the intermediate ambulatory and main arcade columns. It is also possible that the intermediate piers at the western termination of the choir were also part of this early work, but the originals were obliterated in the late thirteenth- and early fourteenth-century reconstruction. These lost intermediate piers would have been close in section to the crossing piers. It is likely that the whole series of piers defining the western termination of the choir was constructed in conjunction with the westernmost responds of the choir peripheral wall, which included the stairs giving access to the tribunes on north and south (Fig. 3, b). This is confirmed by the character of the bases. The wider, westernmost choir bay may reflect the addition of the transept to the original design, as well as the accommodation of the additional space required in the plan for the stairs giving access to the tribunes.

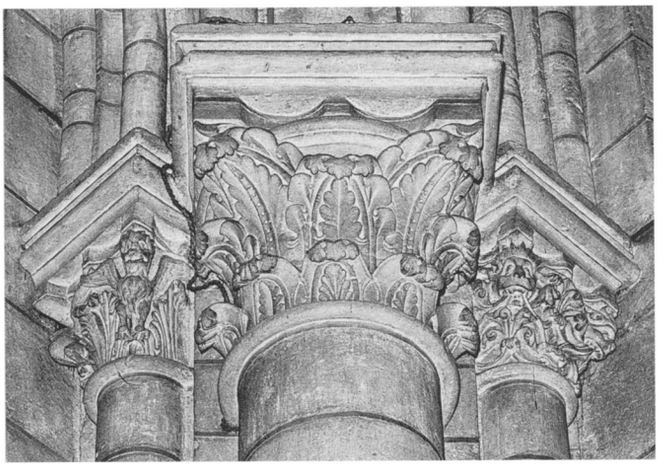
[28] The circumferences of the intermediate supports, with the exception of those at 15aO and 15aR, are remarkably consistent, ca. 2.86cm. Those in the turning bays are a fraction more slender, and average 2.84cm in circumference. The smaller diameter might also be a response to the considerably narrower dimensions of the bays east and west of these supports.

[29] The plinths of the intermediate ambulatory supports on the north side of the choir and the turning bays vary from 60 to 63cm in height, with the exception of the transitional supports at 15aO and 15aR, where the plinths are only 57cm high. The height of the plinths in these two supports is closest to those of the intermediate ambulatory supports on the south side of the choir, which range from 57 to 59cm.

[30] There is a general tendency for the diameters of the supports to increase as work progressed east to west.

[31] On the date and style of the choir screen, see Dorothy Gillerman, *The Clôture of Notre-Dame and Its Role in the Fourteenth Century Choir Program*, New York and London, 1977.

[32] Clark, 1985, 39-40, and 1979, 348-65.



8 Capital at N14 (photo courtesy W. Clark)

9 Capital at S13 (photo courtesy W. Clark)

(3) The capitals above the intermediate columns suggest a direct continuity from those above the straight bays of the peripheral wall on north and south (Figs. 9 and 10). In the main arcade and hemicycle capitals, a new and more monumental sculptural vocabulary was introduced, which corresponds to the much larger dimensions of the choir arcade columns (Fig. 11).

The Tribunes and Upper Stories of the Choir

Once the columns and vaults of the choir aisles were in place, work moved up to the tribunes. We know from other monuments that the outer wall of the tribune was usually constructed before the inner, and it is likely that the same procedure was followed at Paris; certainly, it would have made sense to provide a roof over the outer aisle below as soon as possible (Fig. 15).[33] Although there is great consistency in the handling of the tribune details (for example, the bases: Fig. 5, d), there are two reasons for supposing that work at the tribune level began on the north side and moved clockwise towards the south. The first has to do with changes in design visible at the juncture of the choir and transept on the south side (Fig. 12), where a new type of respond was introduced. This respond, consisting of a flat pilaster flanked by shafts, instead of the more conventional arrangement of engaged shafts supporting each element of the vaults, is unlike any other support in the choir and anticipates the design on the western crossing piers.[34] It is important because it represents the first introduction of the taste for flattened forms that was then adopted consistently in the nave (Fig. 1).[35] The capital at this point in the tribune also anticipates the style of the capitals in the most eastern aisle responds of the nave (Figs. 13 and 14). The first detached, or *en délit*, shafts at Notre-Dame can also be found in the arm of the choir tribune that folds out into the south transept, an observation that has not to my knowledge been made before in the literature. These detached shafts are a fundamental characteristic of the design of the nave. In combination, these changes in design in the choir tribune are so fundamental that we can assume that direction of the workshop passed to a new master, the second at the site since the inception of the work.

The second reason for supposing that work started on the north side of the choir tribune is provided by a series of views of the interior made prior to the restorations of the nineteenth century (Figs. 16, 17; cf. the present state, Fig. 18). These views of the interior, as well as the plaster model of the cathedral made in 1843 and now in the Musée des Monuments Français, indicate that there were large single openings in the tribune arcading on the east face of the north transept arm, an arrangement like that at Senlis (begun 1150-55),[36] and like the tower bays at Noyon, dated by Seymour to about 1155 and completed by 1165-70.[37] The present disposition at Notre-Dame, in which the tribune openings of the east wall of the north transept match those elsewhere in the choir, is the result of Viollet-le-Duc's restoration.

The consistency in the handling of details and the restoration in the nineteenth century in the choir tribune pre-

[33] It can also be assumed that the vaulting of the ambulatory followed immediately the erection of the columns, as these vaults would have served as a platform supporting the work on the upper stories.

[34] This has also been noted by Clark and Mark, 52, n. 15. Branner, 1962, 39, vaguely suggested this, but without specifying that the second master took over while work was still proceeding in the choir tribunes. The triple unit screens inside the tribune at this location also anticipate the design of the tribune in the nave, as has been pointed out by Clark and Mark, *ibid.* However, the screen on the north, which is pierced by an oculus, is a complete fabrication of the 19th century; no such screen existed before Viollet-le-Duc, as is visible in Fig. 16. The absence of this screen on the north is another index of the earlier date of this side. There are, it is true, many inconsistencies in representations of the interior prior to the restorations, but the large single openings and absence of an interior screen on the north side remain constants.

[35] Indeed, the supports in the west wall of the transept represent an expansion of the motif of a respond composed of pilasters, as it appeared in the choir tribune on the south side. As will be seen below, I shall argue that work was begun on this part of the nave at about this period.

[36] See Dominique Vermand, "Étude historique et monumentale," in *La Cathédrale Notre-Dame de Senlis au XIIe siècle*, Senlis, 1987, 3-107, esp. 47-48.

[37] Seymour (as in n. 17), 58.

10 Capital at R11 (photo: James Austin)

11 Capital at P16 (photo: James Austin)

clude an exact definition of the time when the leadership of the workshop changed from the first to the second master. Certain subtle modifications in the dimensions of the plinths in the last curving bay on the south side suggest that the latter may have taken over when work on the inner tribune wall had reached this point.[38] As will be seen below, this roughly corresponds to evidence that flyers may have been introduced in the choir in the turning bays and south side. The construction of the inner wall would therefore have lagged four to five bays behind that of the outer wall. As Seymour pointed out for Noyon, the construction of upper stories often began in areas adjoining the spiral stairs;[39] at Notre-Dame the evidence suggests a clear progression from the spiral stair on the north towards that on the south.

The presence of a new master builder during the construction of the later stages of the choir tribune permits several hypotheses. Although none can be precisely confirmed given the present state of the monument, they may be important for our understanding of the design of the cathedral as a whole. The second master may have decided to heighten the elevation from that originally intended by his predecessor. The oculi, which are such a profoundly original addition to the third story of the elevation,[40] may be the invention of the second master;[41] they effectively transform the elevation of Notre-Dame from what might be viewed as its model, the elevation of Senlis. At Senlis the original elevation as reconstructed by Vermand had the same large expanses of flat wall.[42] It is reasonable to assume that the construction of the third story with the oculi followed closely the erection of the tribune arcade, for the roof over the tribune galleries protecting the vaults below abuts the wall at the top of the oculi openings (Fig. 15). It could be argued that the aesthetic of the pierced circular openings in the third story is in keeping with the general spirit of the nave elevation, in which the wall is treated as a thin, *pressed* screen, an effect greatly enhanced by the circular openings that pierce the wall at this level. In addition, the oculi lighten the weight of the masonry resting on the lower levels of the elevation, and are consistent with the tendency of the second master to thin down the elevation as much as possible (Fig. 24).[43] In the choir, this may have been especially important: the wall is substantially thicker and heavier than in the nave, and if the elevation was heightened the oculi would have alleviated stress on the lower parts of the wall. The numerous structural problems in the choir, which in part account for Viollet-le-Duc's reworking of the east face of the north transept arm and the much earlier reconstruction of supports in the west bays of the choir, attest to problems of stability in this part of the building. These structural difficulties may have resulted in part from changes to the design of the choir (including the possible addition of a transept, if one were not originally intended), changes that were introduced while construction was in progress, as well as from probable inadequacies in the foundations.

[38] Plinth heights between Y15 and Y9 are 23 to 26cm, whereas those to the east and north measure 17 to 20cm.

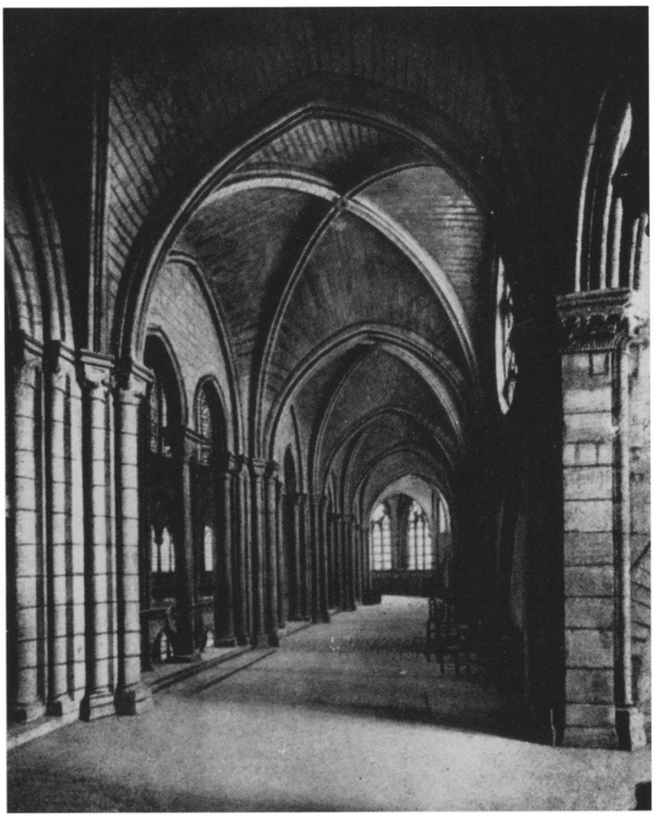
[39] Seymour (as in n. 17), 56, and Vermand (as in n. 36), 33ff.

[40] They are, however, anticipated in the circular openings in the back walls of the tribune galleries below, though the present openings are the result of 19th-century restoration. The evidence of the original openings discovered by Viollet-le-Duc gives no indication as to whether they might have existed around the entire circumference of the choir. See Viollet-le-Duc (as in n. 21), 8.

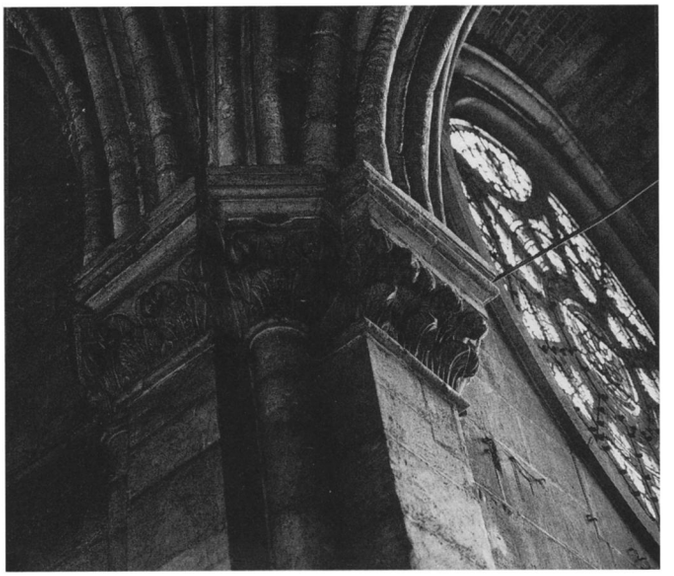
[41] The rectangular openings of the third story at St.-Germer-de-Fly, where a date as early as 1135 for the beginning of construction has recently been proposed by Jacques Henriet, may have been an inspiration ("Un édifice de la première génération gothique: L'abbatiale de Saint-Germer-de-Fly," *Bulletin monumental*, CXLIII, 1985, 93-142).

[42] Vermand (as in n. 36), 53-55, and 71. The absence of moldings between tribune and clerestory is especially striking in relation to Notre-Dame. In this connection, it is worthwhile recalling that, with radiating chapels and no transept, the original plan of Notre-Dame would have been very close to that of Senlis as well.

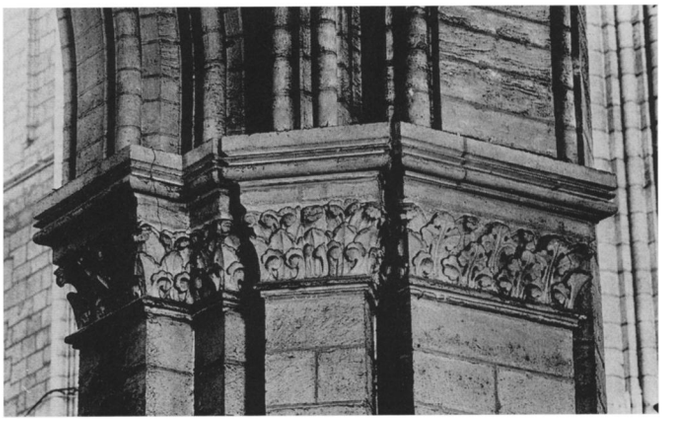
[43] Cf. Fig. 20 and the discussion of the nave wall structure below.



12 Respond in choir tribune at juncture of choir and south transept arm (Z10) (from Aubert, 1920)



13 Capital at Z10



14 Capital at Q8 (photo: James Austin)

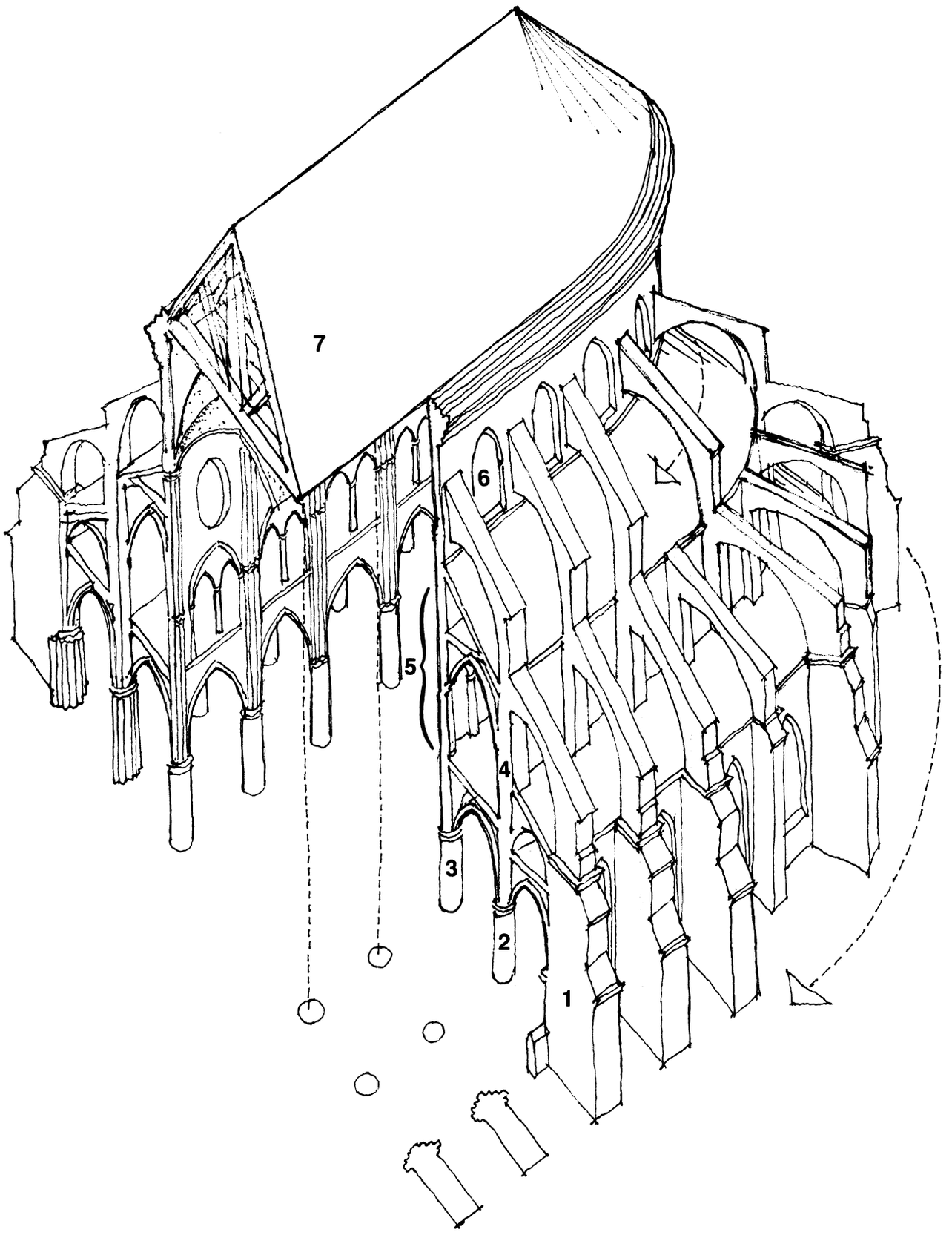
I shall argue in the following pages that the nave was designed from the outset (that is to say, from the lowest courses of the plinths on up) with the premise of flying buttresses as an additional structural element to support the upper levels of what is a remarkably tall and thin elevation.[44] It is likely that flyers were introduced in the continuing construction of the choir. The stability of the structure, especially if the elevation were made taller during construction, would have depended upon the addition of flyers to a structure not originally intended to have them.[45] The restorations of the nineteenth century and the reconstruction of the flyers by Jean Ravy in the fourteenth century have obliterated all evidence of the original flyers. But the plaster model of the cathedral made in 1843 in the Musée Nationale des Monuments Français and a number of pre-restoration photographs show the fourteenth-century flyers emerging from rough and presumably older vertical buttresses from the north side of the axial bay around the south side; those may date back to the twelfth century (Fig. 19).[46] In any case, it is hardly possible that the entire nave elevation could have been designed around an architectural element that had never been tested, as has so often been maintained.[47] Good arguments have been put

[44] See Fig. 20. This can be seen in the striking and consistent reduction of the actual thickness of the walls (at ground level, for example, the choir walls are ca. 59cm thick, whereas in the nave the wall thickness is reduced to ca. 45cm), and also in other details. For example, the alternating intermediate aisle supports with a cluster of *en délit* shafts around a cylindrical core correspond in their location to the flyers supporting the main transverse arches of the vaulting system. It makes far more sense to consider the design of these supports in relation to the vertical props for the flying buttresses above them than in relation to the sexpartite vaults of the nave. Bony (as in n. 3), 182, points this out.

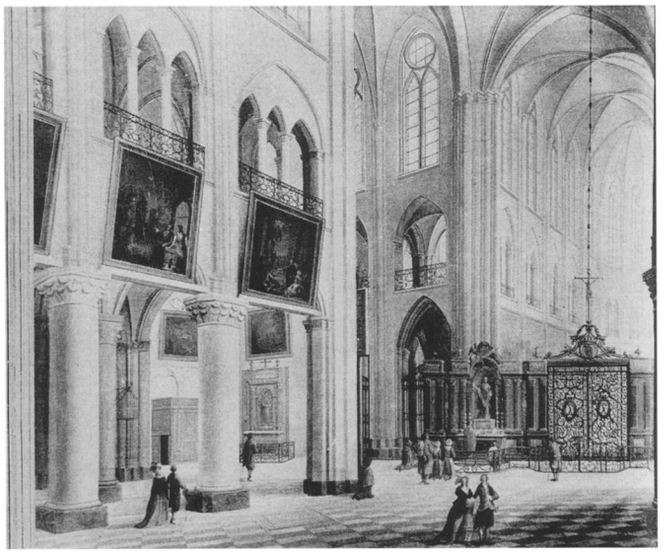
[45] The hypothesis of flyers in the choir is not new: Viollet-le-Duc, I, 82, and II, 293, takes this for granted; John James is currently doing research in this direction; Louis Grodecki made a strong suggestion along these lines in "Les arcs-boutants de la cathédrale de Strasbourg et leur origine," *Gesta*, XV, 1976, 1-2, 43-51; and most recently Kimpel and Suckale, 150. Also see n. 47 below.

[46] They are also visible in the longitudinal section of the exterior by Leconte. It has been suggested to me by William Clark that these are later reinforcements. Their destruction precludes final conclusions.

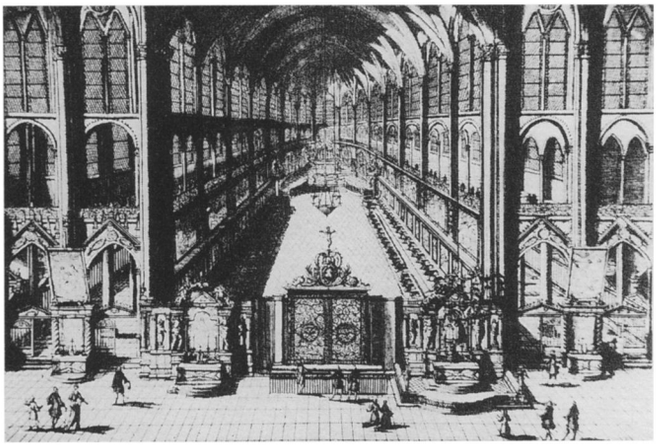
[47] And so I would argue the reverse of Clark and Mark's suggestion, 53, that the flying buttresses of the nave of Notre-Dame were added "perhaps almost as an afterthought." The authors are heirs to a long tradition on this question that goes back to the fundamental article by E. Lefèvre-Pontalis, "L'origine des arcs-boutants," *Congrès archéologique (Paris)*, LXXXII, 1919, 367-96; also see Bony (as in n. 3), 179, 184, 472, n. 36; Clark, 1979, 363-65; Aubert, 1920, 44 and 88-106; Paul Frankl, *Gothic Architecture*, Harmondsworth and London, 1962, 55; and Salet, 102.



15 Schematic reconstruction of sequence of construction in upper stories of choir. Arrows indicate direction of construction at each level; numbers indicate sequence (drawing by Warren Wilson)

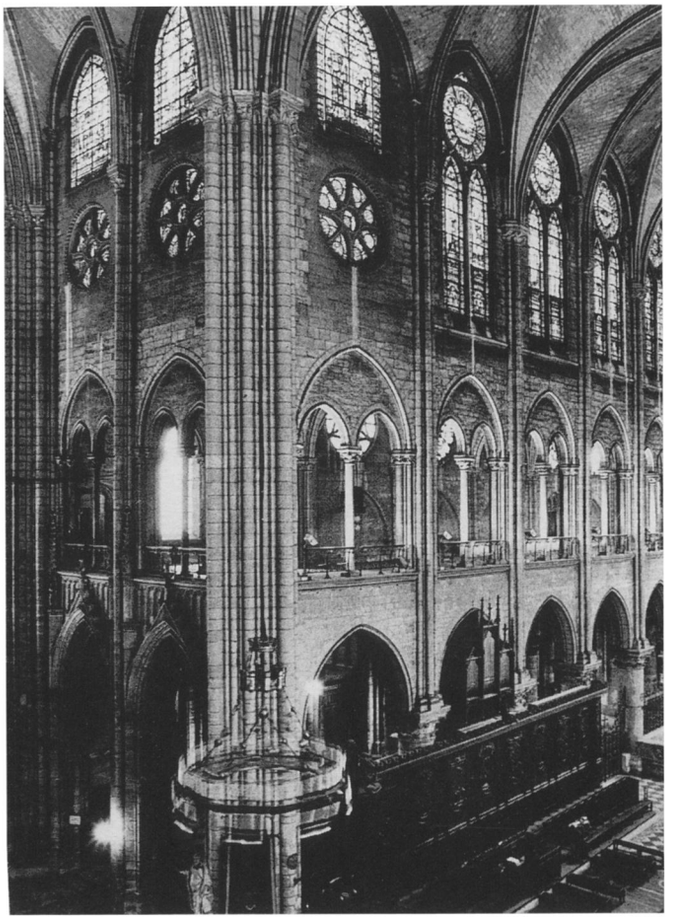


16 View of interior prior to the French Revolution (photo: Musée Notre-Dame, Paris)



17 View of the interior by Aveline

forward for dating flyers in a number of monuments in the mid- to late-1160s; it seems highly likely that they made an appearance in the exceptionally tall choir elevation of Notre-Dame as well.[48] One last point should be made about the construction of the choir: it was built quickly, and certain details, such as the absence of carved moldings from the abaci at the springing of the choir vaults, testify to a kind of architectural shorthand in the uppermost parts of the building.



18 East face of north transept arm and north side of choir from the west

Dating of the Choir

Four reliable twelfth-century chroniclers refer to Bishop Maurice de Sully as having initiated the work on the new cathedral.[49] Yet this attribution is problematic.[50] The tradition that the cornerstone was laid in 1163 may well be either apocryphal or largely symbolic; the late date of this information, as well as the bad relations between the bishop and Pope Alexander III, would tend to suggest the former.[51] It is striking that neither the obituary nor Maurice de Sully's own testament makes any reference to him as founder of the new church.[52]

The bishop's silence might be the result of the fact that he was a canon and then a deacon of the chapter prior to his election as bishop in 1160. The chapter was responsible

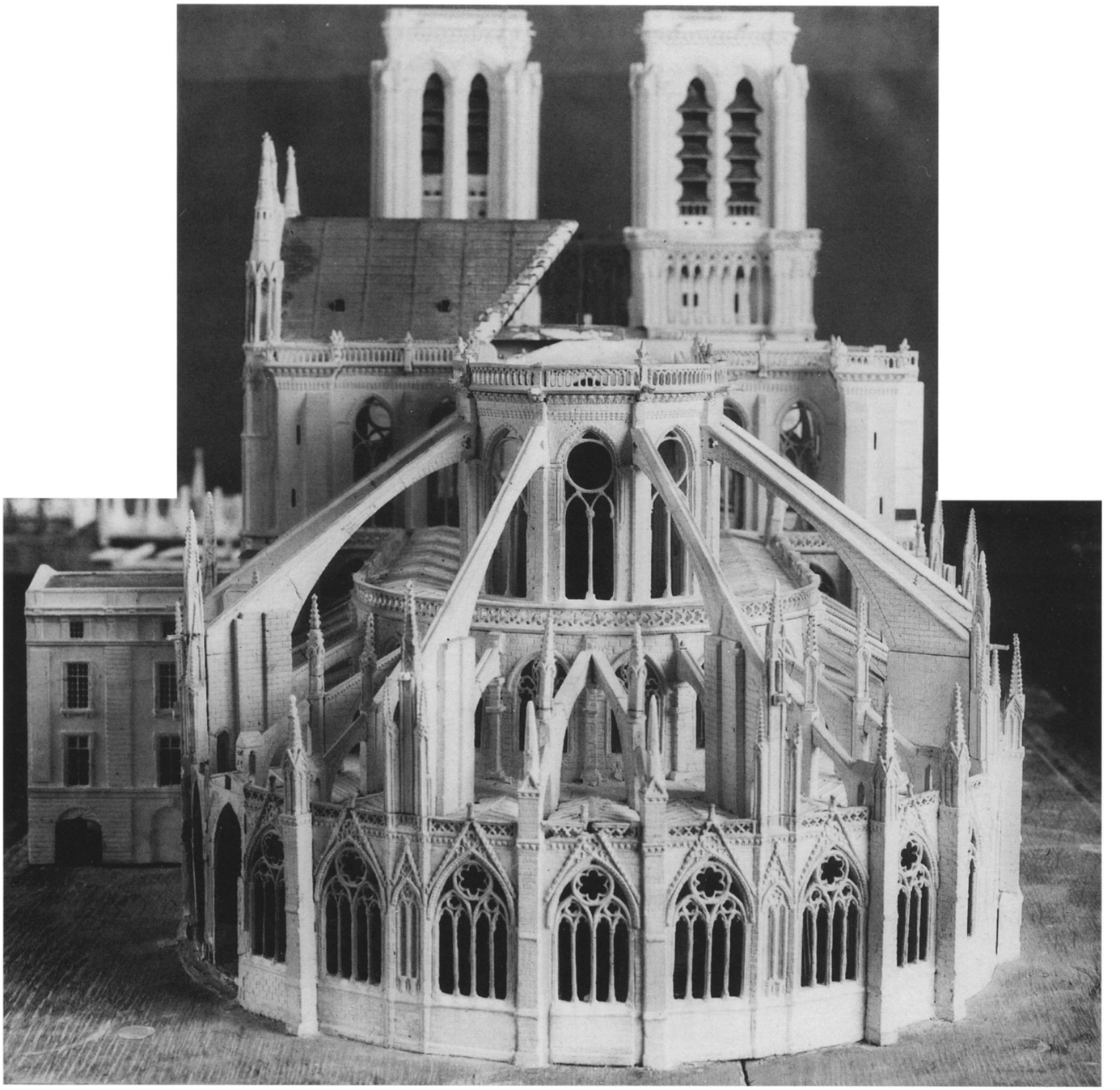
[48] This idea has been most cogently expressed by Grodecki (as in n. 45). On early flying buttresses, also see A. Prache, "Les arcs-boutants au XIIe siècle," *Gesta*, XV, 1976, 31-42; *idem*, "Les arcs-boutants du chevet de Saint-Remi de Reims," *Bulletin de la Société Nationale des Antiquaires de France*, 1973, 41-43; F. Salet, "Voulton," *Bulletin monumental*, CII, 1944, 91-115; J. Henriet, "Recherches sur les premiers arcs-boutants. Un jalon: Saint-Martin d'Étampes," *Bulletin monumental*, CXXXVI, 1978, 309-324; *idem*, "La Cathédrale Saint-Etienne de Sens: Le parti du premier maître et les campagnes du XIIe siècle," *Bulletin monumental*, CXL, 1982, 81-174; and L. Grodecki, *Gothic Architecture*, New York, 1977, 48.

[49] The text by Robert of Auxerre, the continuation by Sigebert, and the text by Robert of Torigny can be found in Mortet and Deschamps (as in n. 15), 111. The description of Caesar of Heisterbach was preserved by A. Muldrac, *Compendiosum Abbatiae Longipontis Suessionensis Chronicon*, Paris, 1652, 91-92: "Ille vero, cum in aedificatione ecclesiae Beatae Dei Genitricis Mariae nimis ferveret, consuluit ei quatenus pecunias suas ad structuram operis inchoati contraderet." The relevant texts are also quoted by Aubert, 1920, 28.

[50] See Mortet, 1888, 41, and more recently, Clark and Mark, 50, n. 7.

[51] Mortet, 1888, 42-43, B. Mahieu, "La naissance de Notre-Dame de Paris," *Bulletin de la Société de l'Histoire de Paris et de l'Ile de France*, XCI, 1964, 34-36; Salet, 99; and Clark, 1985, 42.

[52] See Guérard, IV, 18; Mortet and Deschamps (as in n. 15), 114.



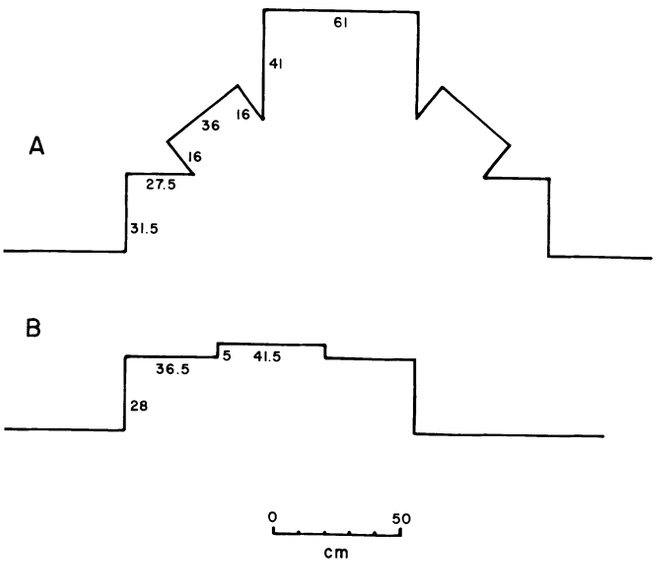
19. Plaster model showing flying buttresses prior to restoration (photo: Arch. Photo. Paris/S.P.A.D.E.M.)

for all matters pertaining to the physical structure of the cathedral,[53] and Maurice de Sully might have been a central figure in the decision to rebuild while he was still a canon, or when he became deacon in 1159. His role in the initiation of the work might then indeed have been clear to his contemporaries, but it might have seemed presumptuous to the bishop himself (as well as to the chapter) had he taken credit alone for what had been a collective decision to rebuild.

On the basis of comparisons with moldings and capitals at St.-Germain-des-Prés, the argument has recently been made that construction of Notre-Dame may have commenced as early as 1150-55.[54] This evidence is not conclusive, however, since at Notre-Dame itself there is a wide range of types of base profiles in parts of the building that must have been constructed at very nearly the same time; and, conversely, similar types of base profiles occur in

[53] On the chapter at Notre-Dame, see Pierre-Clement Timbal and Josette Metman, "Évêque de Paris et chapitre de Notre-Dame: La juridiction dans la cathédrale au Moyen Age," *Huitième centenaire de Notre Dame de Paris*, Paris, 1967, 115-40.

[54] Clark, 1985, 41.



20 Responds: **a.** choir; **b.** nave, south side

places that might be separated by as many as five to ten years in date, as in the choir tribunes and the peripheral walls of the ambulatory below (Fig. 5, a, d). The bases along the peripheral wall of the choir are very close to those found in the original parts of the choir at Meaux Cathedral, dated by Kurmann to 1170-80, and probably built ca. 1175.[55] One cannot expect workshops to evolve similar styles of capitals in lock-step with each other. Some of the larger and more prestigious workshops might have been content to maintain a mode of carving that had been well received. There is good evidence for such a situation in the acanthus leaf capitals at Senlis, for example, which are very close to those in the choir at St.-Denis, but which must be about ten years later.[56] It could also be argued that the design of the choir peripheral wall, with its massive engaged shafts, was as "old-fashioned" as the earliest capitals in the peripheral walls. Comparison with the Cathedral of Senlis, also built in the context of powerful royal influence, is telling.[57] The dramatic increase in scale of the Parisian cathedral, the suppression of alternation in the main arcade, and the systematization of structure and details all suggest a date not before ca. 1160. But the treatment of moldings and capitals cannot take us much beyond that date.

In this connection, it is important to note that all the documentary evidence for reconstruction dates to the early 1160s or later. Several documents of 1163-64 concern the piercing of a road to the *parvis* of the façade.[58] In 1177 the choir was complete except for the vaults.[59] It was consecrated in 1182,[60] though this does not mean that all the choir vaults were finished at that date. It can be supposed that work began in the tribunes by the late 1160s or early 1170s. By the time construction of the choir tribunes reached the southwest corner, and perhaps before, a new architect took over direction of the work; if he then introduced flyers into the design of the choir, prior to laying out the south wall of the nave, this would have occurred in ca. 1170. This date accords well with the appearance of flyers only a few years later, in 1176-77, at Canterbury in the work of William of Sens[61] and at St.-Remi at Reims in the early 1180s.[62] One further and hitherto unpublished example of early flying buttresses can be seen on one side of the surviving west wall at the Cistercian abbey church of Ourscamp, a flyer that also dates to ca. 1175.[63]

The Three Eastern Bays of the Nave[64]

In spite of the overall unity of the interior, there is a pronounced change in character between the choir and nave. With the exception of Clark and Mark, whose recent observations are astute, this has led most scholars to conclude that the nave was begun only once the choir was complete.[65] Yet as has been seen above, the evidence suggests that the construction of the nave was initiated while the choir was still in progress. The appearance of a respond in the choir that anticipates those of western crossing piers, the consistent adoption of detached shafts in the nave (Fig. 1) after their modest introduction in the south tribune of the choir, and the similarities of base profiles between the choir tribunes and the south outer wall of the nave (Figs. 5, d, and 21, a) indicate that there was no interruption of work between these two parts of the cathedral. In fact, work on the south side of the nave was well under way

[55] Peter Kurmann, *La Cathédrale Saint-Etienne de Meaux: Étude architecturale*, Paris, 1971, 40.

[56] See Vermand (as in n. 36), 47-49, who dates the construction of the choir of Senlis as beginning probably in the early 1150s and completed by 1162-63. For his discussion of the capitals of Senlis and St.-Denis, see 40-41.

[57] *Ibid., passim.*

[58] Mortet and Deschamps (as in n. 15), 112, and Mortet, 1888, 83-87.

[59] Robert de Torigny, in 1177, stated: "Mauricius, episcopus Parisiensis, jam diu est quod multum laborat et proficit in aedificatione ecclesiae praedictae civitatis, cujus caput jam perfectum est, excepto majori tectorio. Quod opus si perfectum fuerit, non erit opus citra montes, cui apte debeat comparari"; in Delisle (as in n. 15), II, 68.

[60] *Ibid.*, n. 3.

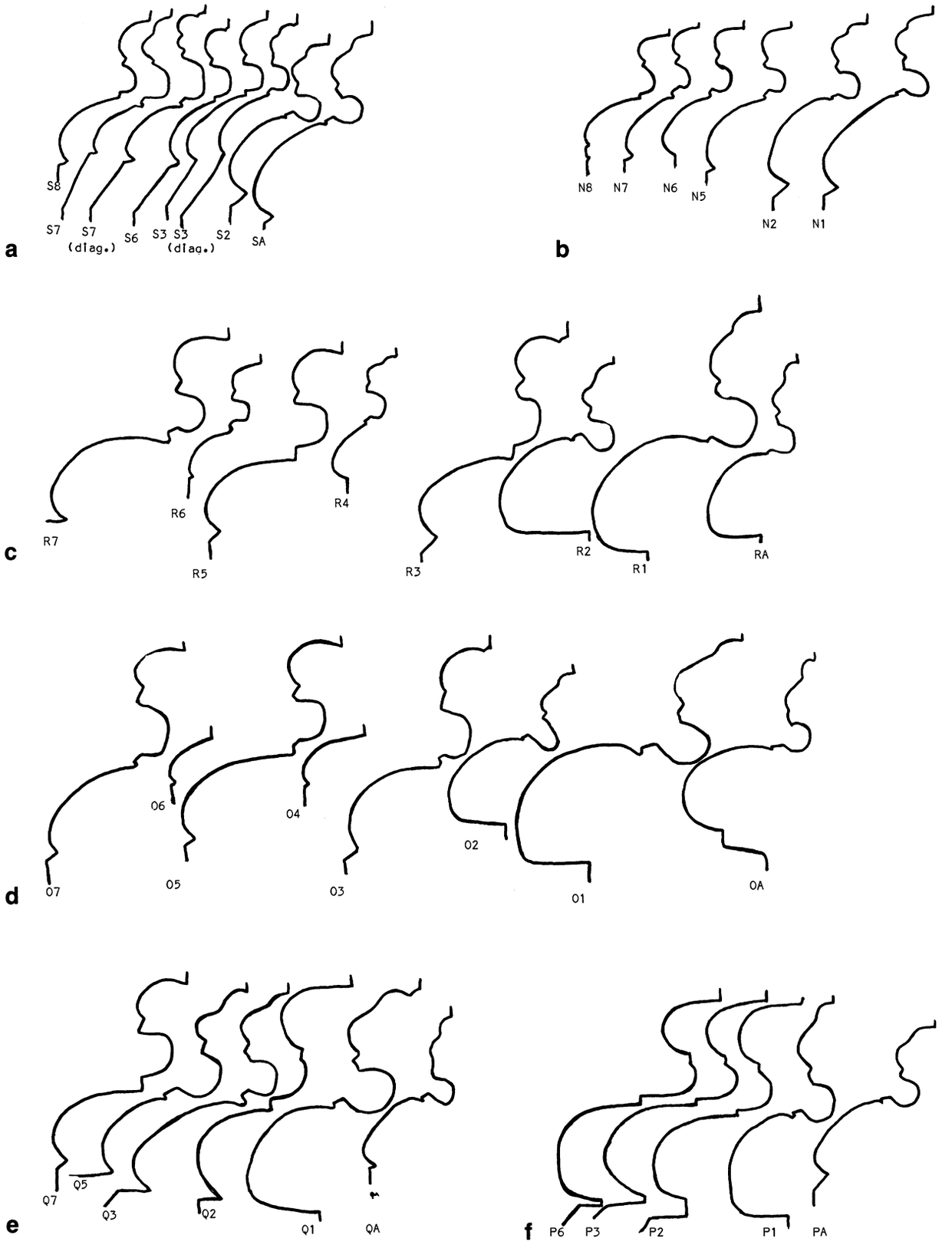
[61] Madeleine Caviness, "Canterbury Cathedral Clerestory: The Glazing Program in Relation to the Campaigns of Construction," *Medieval Art and Architecture at Canterbury (British Archaeological Association Conference Transactions, 1979)*, London, 1982, 46-55.

[62] Prache (as in n. 48), 1976, 31-42.

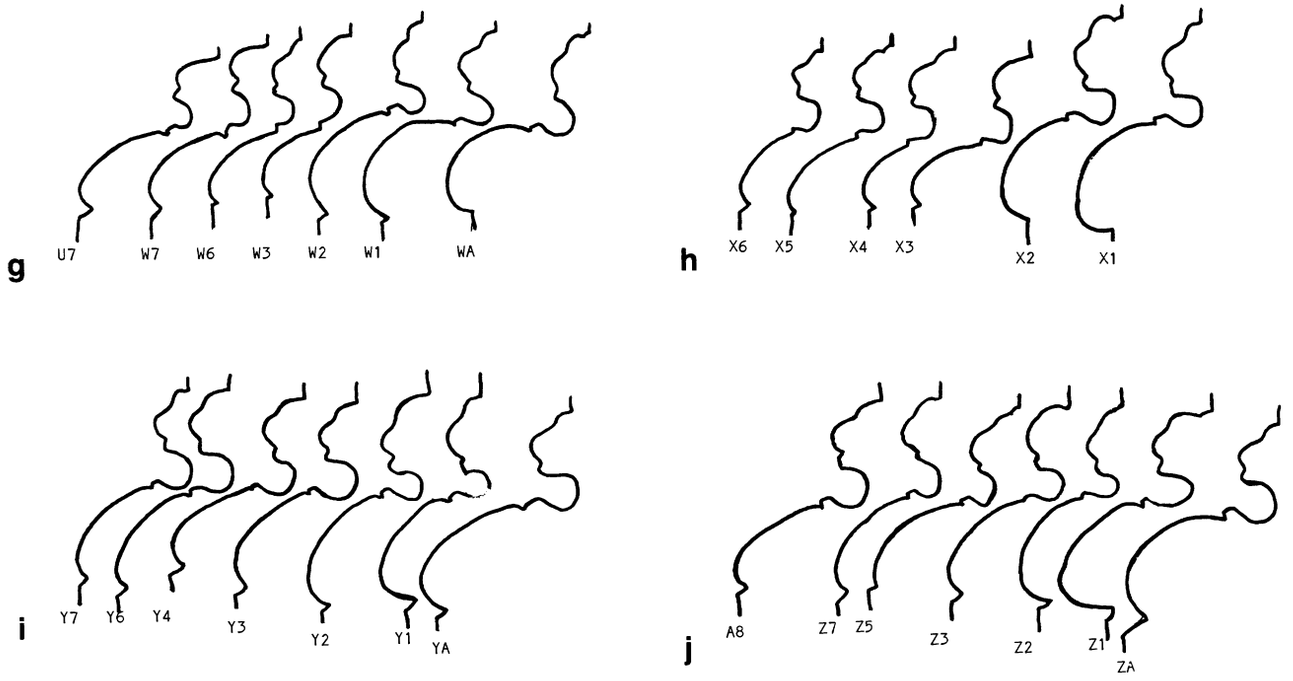
[63] The dating of the church is discussed in C. Bruzelius, "The Twelfth-Century Church at Ourscamp," *Speculum*, LVI, 1980, 28-40; I did not on that occasion discuss the flyers, for which there is evidence at the east end as well as in 19th-century lithographs. Professor Terryl Kinder of S.U.N.Y. at Brockport argues that the flying buttresses of the nave at the Cistercian abbey of Pontigny are also original and must be early in date.

[64] By bays I mean each sexpartite unit of vaulting, consisting of six cylindrical supports in the nave below.

[65] Clark and Mark, 47, n. 3, and 52, n. 15. That this was not the case is evinced by the fact that the westernmost choir vault is canted upwards to reach the higher level of the crossing and transept vaults. The westernmost choir vault was therefore raised towards the west to reach this new level, and could not have been constructed until the crossing and transept were ready to be vaulted or were already vaulted. See Fig. 22, c.



21 Base profiles in nave: **a.** south aisle responds; **b.** north aisle responds; **c.** south intermediate supports; **d.** north intermediate supports; **e.** south main arcade supports; **f.** north main arcade supports; **g.** north tribune supports, outer wall; **h.** north tribune supports, interior tribune arcade; **i.** south tribune supports, interior arcade; **j.** south tribune supports, outer wall



while the upper levels of the choir were still under construction (Fig. 22). One can hypothesize that the setting out of the walls of the south transept arm and the south side of the nave occurred while work on the choir was temporarily interrupted by the erection of centering for the choir tribune vaults, the scaffolding for the upper stories, or the construction of the choir roof.

While the elevation of the nave is superficially similar to that of the choir, giving the monument great unity, the flattening of the responds, the substitution of *en délit* elements for engaged shafts, and the reduction in the thickness of the wall in the nave suggest a complete rethinking of the structural system of the building while construction of the upper stories of the choir was in progress (Figs. 1 and 18). These elements were redesigned as the result of the incorporation of the flying buttress as an integral part of the new elevation and structural system. However, the high degree of confidence shown in the use of the flying buttresses in the nave indicates that they were not "invented" here. As noted above, the flyer had clearly been tried out before on a number of occasions, almost certainly including the choir itself, and its implications were fully understood.

The nave elevation is thus a refinement of ideas introduced by the second master in the choir. The detached shafts had already made a timid appearance in the south choir tribune. In the nave, these shafts are actually set into concave recessions in the wall, emphasizing its extreme thinness and flatness. The oculi, probably the innovation of the second master, were enlarged in the nave, thus enhancing the effect of the wall as an attenuated screen (Figs. 18 and 24). At the same time, the tribune openings were redesigned with three openings per unit rather than two, and pilasters were substituted for shafts at the periphery of each unit of tribune arcading to accentuate the opening of the wall as much as possible.

The Arcade Level of the Nave

There is a certain degree of experimentation on the south side of the nave that is absent from the north, especially in the forms of the base profiles (Fig. 21, a), which at times vary from the transverse and diagonal shafts within a given respond. From S7 through S3 the plinth dimensions are consistent, though they increase slightly in height and width from east to west. The masonry coursing is also regular; the walls were thus all erected at the same time.

The north wall of the nave probably followed shortly thereafter. On this side of the church, the width of the nave was expanded.[66] As on the south, the length of the eastern three bays (N7 to N2) was set out in one continuous campaign, with the plinth at N2 set out but left without its base until the completion of the westernmost bay of the nave sometime later (Figs. 21, b, and 22, b).[67] (Of course the transept terminal walls, which were entirely rebuilt in the

[66] The south wall of the nave is aligned with the choir, whereas the north transept terminal wall was constructed off-axis, so that the entire nave could be widened. At the west side of the crossing, the nave expands by 1.5m (from 12.5 to 14m).

[67] The plinth corresponds in its dimensions to those to the east, but the base and the masonry coursing correspond to that to the west.

thirteenth century, are an unknown part of the equation.) The plinths on the north are much taller (ranging from 79.5 to 86cm) than their counterparts on the south, which are 50.5 to 56.5cm tall. Base profiles are uniform, with a clearly defined fillet raised between the cavet and the lower torus (Fig. 21, b).

As in the choir, construction moved from the outer walls towards the inner supports, with the main arcade the last part of the lower story to be erected. There is evidence for this in the handling of plinths, bases, and circumferences of the cylindrical supports. The similarities between the bases in the intermediate aisle supports on the south side and those against the north peripheral wall (Fig. 21, c, b) suggest that, on the arcade level, work on the south side was usually a step or two ahead of that on the north (Fig. 22, b). The design of certain details on the north side of the nave, such as taller plinths, which emphasize verticality, often seems to be a refinement of the elements first introduced on the south.[68] While the base profiles suggest that some of the same templates were being used on either side of the nave, other details indicate that internal consistency was being approached in purely local terms; there was clearly no concern that the plinths against the north wall should exactly match those on the south. The heights of the plinths under the intermediate supports in the south aisle correspond to those of the flanking south peripheral wall, and the same is true on the north, again with a slight heightening of the plinths from east to west.[69] On both sides, the laying out of the intermediate supports extends only to O3 to R3, leaving the westernmost bay (O1-O2 and R1-R2) of the nave untouched (Fig. 22, c).

The base profiles suggest that the intermediate nave supports on the north were constructed shortly after those on the south (Fig. 21, c, d). The profiles on the bases underneath the columns surrounded by detached shafts on the north side are abbreviated (Fig. 21, d, at O6 and O4). This may reflect an effort to accelerate construction, or it may have been an attempt to economize on the expenses of the laborious carving of the numerous bases underneath these columns surrounded by *en délit* shafts. This simplification does not appear on the south. In the intermediate supports on the north side, the plinths are higher than on the south.

During the early stages of construction of the nave, work on the south side thus seems consistently to have anticipated that on the north. In the construction of the main arcade, however, the situation is more complex. The first plinth and base to be set in place were probably at Q7, as the base profile is closest to those in the intermediate aisle supports (Fig. 21, c, e) and the plinth is several centimeters lower than any other in the main arcade.[70] The base profiles down the north side of the nave from P2 through P7 are unlike any others in the cathedral (Fig. 21, f). In comparison with those on the south side of the nave, Q3 through Q6, these bases might seem an older type. But the bases on the south side with a depressed upper torus are anticipated by the bases below one of the intermediate supports in the south aisle (R4), while the bases on the north side of the main arcade reappear under both supports with a single attached shaft in the next to last pair of columns in the nave (P2 and Q2).[71] Since these westernmost nave supports are later in date, it is also likely that the north main arcade is slightly later than the south. The number of drums in each column is greater on the south, and corresponds to the average number of beds in the intermediate supports in the north and south aisles, while the taller drums of the north arcade are continued in the westernmost nave piers along with the unusual base profile already mentioned.

One other possibility might explain the nature of the evidence here. If great efforts were being made to complete the nave rapidly, two separate groups of masons could have been hired to work simultaneously on either side of the nave.[72] Each workshop might have had some freedom to design its bases and plinths. If this were the case, and the two sides were constructed at the same time but by different workshops, we might expect to find roughly the same dimensions for the circumferences of the columns and the heights of the drums. These dimensions would be important for the design of the elevation as a whole and would therefore have been established by the master in charge of the entire project. The matching pair of columns with a considerably more slender circumference at P5 and Q5 (roughly 3.94m, as opposed to an average of 4.20m elsewhere) suggests that they were built and intended as a pair even though their base profiles and plinth dimensions are different.[73] Their narrower dimensions represent a refinement in design that entailed the slight reduction in scale of the cylindrical supports underneath the minor transverse rib in the sexpartite vaulting system. (This subtlety was abandoned in the next bay, however, where the dimensions of P3 and Q3 match their counterparts to east and west.)

[68] The plinths on the north side have been recut, but their height remained the same. In dating the south side before the north, I disagree with Aubert, 1920, 45, who dates the north before the south on the basis of the irregularities in the arcading in the west wall of the north transept arm. In my view, these irregularities were the result of the misalignment of the north transept arm.

[69] On the south side supports R7-R3 range from 49 to 51cm in height; on the north from O7 to O3 they range from 83 to 96cm in height.

[70] The plinth here is 40.5cm high. Q6 and Q5 are 43-44cm high; Q3-4 are both 48cm high. On the north P7-P4 are 43cm tall, and P3 is 39.7cm tall. The circumference of Q7 is also smaller than the other arcade supports, with the exception of P5 and Q5, about which more will be said below. In this connection, one wonders if certain elements were not on occasion erected as models or trial forms, prior to the stabilization of details in the supports to follow.

[71] See the following discussion of these piers and the construction of the west façade and upper walls.

[72] John James has independently arrived at some of the same conclusions for the construction of the western bays of the Cathedral of Senlis, "La construction de la façade occidentale de la cathédrale de Senlis," *Notre-Dame de Senlis au XIIe siècle* (as in n. 36), 109-18, esp. 111ff. See Vermand's remarks as well, *ibid*, n. 290. Murray has also documented the same phenomenon at Beauvais. See his forthcoming book, *Beauvais Cathedral: The Architecture of Transcendence*, Princeton, 1988).

[73] P5 has thirteen drums, more than any other support in the main arcade on the north side, while Q5 has fourteen drums.

Elsewhere, the circumferences of the arcade supports from P7-P3 and from Q6-Q3 are identical.

The study of the capitals does not permit conclusions about chronology. There is far greater consistency in style than in the choir, and it is likely that a large number of specialized sculptors were employed to mass-produce capitals that could be placed randomly as supports were completed, as long as the diameters were consistent. The rounded astragals, which appear throughout the choir, are replaced in the nave arcade supports by astragals with a cavet flanked by two tori, the upper projecting beyond the lower, except for P7 and Q7, where the astragals are triangular in profile.

The Tribunes and Upper Stories of the Nave in the Eastern Bays

Once the main arcade supports were in place, work proceeded to the outer walls of the tribune galleries, which permitted roofing over the vaults of the outer aisle below. The evidence of plinths, base profiles, and abaci suggests that work first concentrated on the north side, with the setting out of the tribune walls from east to west from bay 7 to bay 3. Bases with a depressed upper torus gradually supplanted the earlier bases with a rounded upper torus (Fig. 21, g, h); the bases in the south nave tribune, all of this newer type, are much more consistent in their profile than those on the north (Fig. 21, i, j). That the south tribune followed the north (Figs. 23 and 24) is indicated by this consistency in the handling of the plinth dimensions in the south tribune, the profile of the abaci in the south tribune arcade (Fig. 25, c, at Y6 and Y3), the addition of the oculus in the tympanum of the tribune openings, and the ramping of the outer vault segment to permit larger windows.[74]

The precedence of the north over the south in the upper levels of the nave applies to the entire height of the elevation from the crossing piers through N3 and S3. As just noted, the abaci in the tribune arcading on the north side are different from their counterparts on the south; this also pertains to the profiles of the abaci above the main nave responds (Fig. 25, e). In addition, the abaci of the main responds on the north consist of three separate elements (Fig. 24), as in both aisles below, while on the south, including the southwest crossing pier, there is an abacus with a continuous molding having a projecting central element under the transverse rib (Fig. 23). The abaci at the departure of the main vaults on the north correspond in their design to those in the aisles and north tribune below; on the south, the continuous molding of the main abaci at the vault departures is found only in the south tribune below.[75]

Although the differences between the north and south sides persist for the entire height of the elevation in the three eastern bays of the nave, the interval between their construction again may not have been long. The modifications to the south are so numerous, however, and the additions of the oculus and rampant vault in the tribune represent such significant modifications to the original nave elevation, that it is clear that here a third master took over the direction of the workshop, a master who revised and improved the nave elevation design of his predecessor.

Dating of the Nave

Work commenced on the nave while the choir was still under construction. It is likely that the setting out of the north and south walls, as well as the erection of the intermediate ambulatory supports, took place "betweenwhiles,"[76] to borrow Suger's phrase: the immensely complicated work on the uppermost stories of the choir, the construction of an upper scaffolding, the roof, and the erection of centering for the choir vaults would have temporarily put the masons out of work. To make as rapid progress as possible on the construction of the church, it is likely that they were given the task of setting out the initial stages of the nave. If this were the case, it would account for the variations in the treatment of details in the different parts of the lower story of the nave, suggesting that work proceeded there more sporadically than in the choir.

In 1949, Jean Bony noted the similarity of the capitals in the eastern parts of the nave of Notre-Dame to some capitals at Canterbury that can be dated to 1175-77.[77] Yet the main arcade supports were the last part of the ground level to be put in place; a date in the mid-1170s suggests a rapidity of construction in this part of the building that is hard to reconcile with other details, such as the base profiles (Fig. 21, e). Could the capitals have been carved in advance of the elevation of the supports by the capital "specialists," explaining why their style is not reflective of other aspects of the building's chronology?

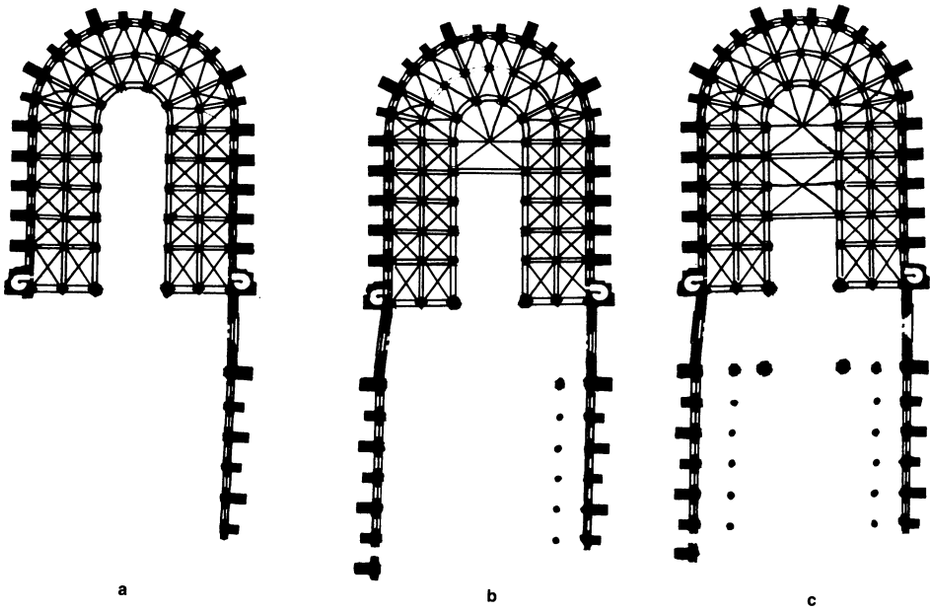
The evidence points to a beginning of construction in the nave ca. 1170. Because the flying buttresses were an integral part of its design and an essential structural element from the outset, we must assume that they were designed in relation to earlier experiments with the form, perhaps in the choir of Notre-Dame itself, but certainly in a number of other monuments (see above). This accords with the fur-

[74] The rampant outer vault quadrant was suppressed in the reconstruction of the clerestory and flyers in the 13th century. The oculus in the south tribune arcading has usually been explained as a response to the need for additional light in the nave (Clark and Mark, 52, and Viollet-le-Duc, II, 286-91). While this is true, it is also important to note that this side is clearly later in date, and that the addition of an oculus is an important index of chronological sequence. In discussions of the south nave tribune, it should be recalled that this part of the church received especially heavy restoration, and that the tribune outer wall is substantially rebuilt. Fortunately, however, evidence of a later date for the south side appears up the entire height of the elevation.

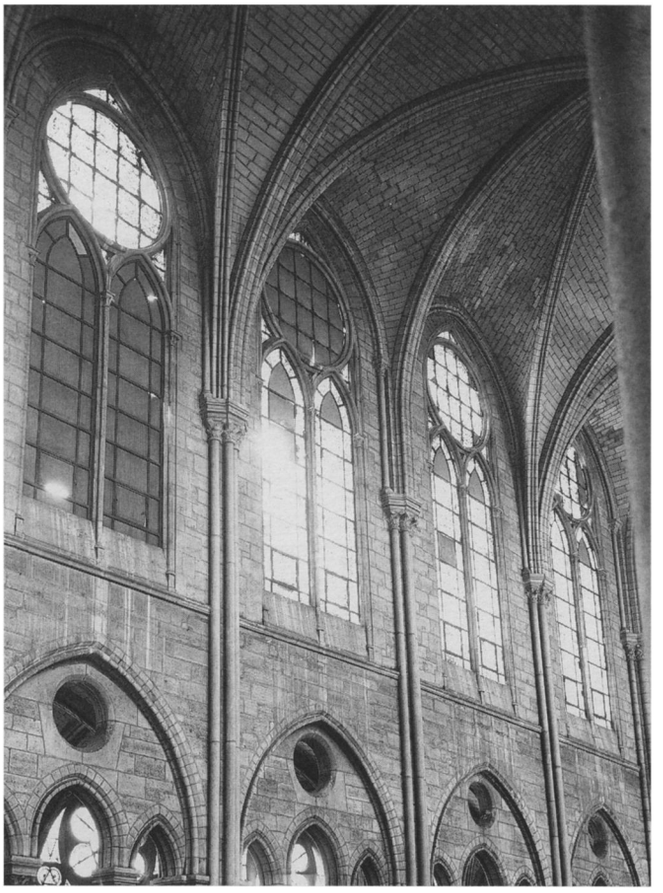
[75] The precedence of the north over the south is indicated by other details as well: the abaci above the supports for the arc formeret continue back to the vault on the south side, whereas on the north these are square. The plinths under these shafts on the south side are chamfered, and the base profiles are consistently different on the north and south.

[76] *Abbot Suger on the Abbey Church of St.-Denis and Its Art Treasures*, ed. E. Panofsky, 2nd ed. Gerda Panofsky-Soergel, Princeton, 1979, 53.

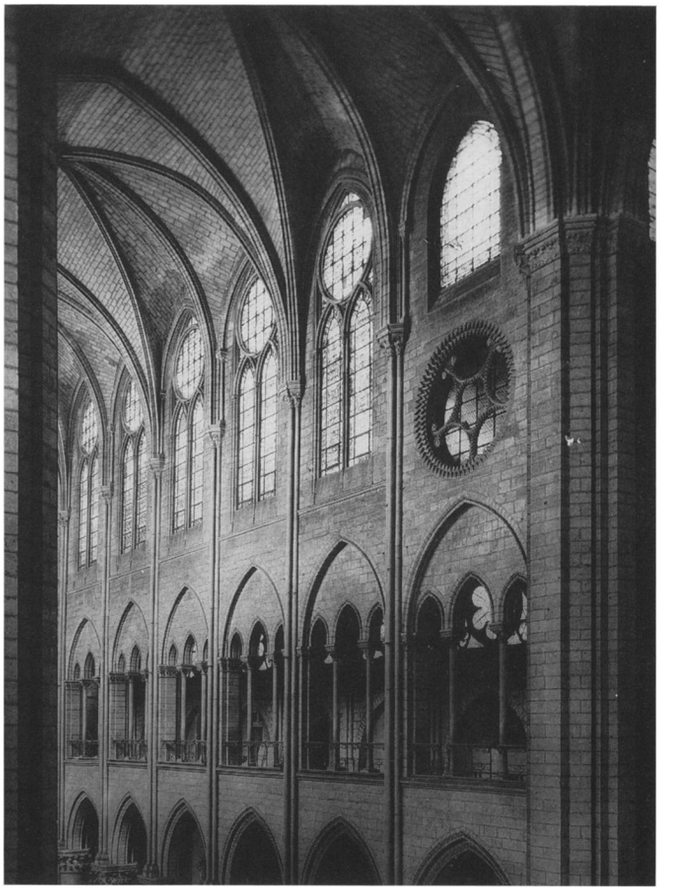
[77] Jean Bony, "French Influences on the Origins of English Gothic Architecture," *Journal of the Warburg and Courtauld Institutes*, XII, 1949, 1-15.



22 Construction phases in nave



23 South wall of nave (photo: Arch. Photo Paris/ S.P.A.D.E.M.)



24 North wall of the nave (photo: Arch. Photo. Paris/ S.P.A.D.E.M.)

ther evidence of connections between Notre-Dame and Canterbury, in the appearance of flying buttresses there in the work of William of Sens in 1176-77.[78] The flying buttresses of the nave of Notre-Dame would not yet have been visible. We can imagine that William of Sens, if he were indeed influenced by the continuing construction at Notre-Dame, may have seen either the flyers in the process of construction on the choir, or drawings or models by the second master at Notre-Dame. William may also have been familiar with the flying buttresses of other monuments.

The relationship between Notre-Dame and the pilgrimage church of St.-Mathurin at Larchant also supports an early date for the design of the nave at the cathedral.[79] As noted by Henriet, the translation of the relics to the choir in 1176 suggests that it was well underway by then, and construction details at Larchant are close to those of eastern bays of the nave of Notre-Dame.[80]

The construction of the upper stories of the north wall of the nave in the eastern bays probably took place from ca. 1180 to ca. 1190, and the equivalent parts of the south side in the following decade. It was surely for the covering of the two eastern bays of the nave that Maurice de Sully left funds in his will in 1196, and the vaulting of these bays must have followed (Fig. 26, b). While there are no documents that establish reliable dates for the construction of the nave, excavations in 1186 that brought to light a number of forgotten relics (among them a purported head of Saint Denis) suggest that by that date work had started on the foundations for the westernmost bay of the nave.[81] In the same year, Philip Augustus and Countess Marie of Champagne founded two chaplaincies at an altar dedicated to Saint Nicholas in bay N7-N8.[82] This bay adjoins the north transept arm, from which it would have been accessible, and one can suppose that at that date the double aisles on both sides of the eastern bays of the nave were vaulted and in use, but that work was still underway in the main vessel.

The Westernmost Bay of the Nave and Façade

The nave was under construction when the façade was begun, leaving the westernmost bay as a lacuna between the nave to the east and the lower stories of the façade structure to the west (Fig. 26, a). The evidence for the precedence of the façade over the westernmost nave bay is twofold: on the one hand, elements in the façade structure correspond closely to elements in the three eastern bays of the nave, and, on the other, the westernmost pairs of supports and the wall that rises above them are disjunctive with the work immediately to the east. Furthermore, there are seams in the masonry in the peripheral wall of the first aisle bays west of the entrance bays on both north and south; these correspond with disruptions in the masonry coursing up the height of the nave elevation.

Construction of the façade began on the north side (Fig. 26, a). Precedence of the north over the south is suggested on the interior by the dimensions of the plinths, about 40-41cm in the northwest corner rising in height to about 79cm on the south side. The former dimension corresponds to the height of the plinths in the main arcade bays 3 to 7, while the latter corresponds to those in the westernmost nave bay.[83] The juncture of the façade with the nave is also much more awkward and irregular on the south.[84]

An examination of the west façade as a whole and the portals in particular reveals that the entire structure was thickened toward the west early in the construction process. Sauerländer has described this process in relation to his extensive study of the portal sculpture, and dates the modification to ca. 1215.[85] The changes to the façade result from a change in the leadership of the workshop; begun on the north side by the master who built most of the nave arcade and the upper stories on the north side, this master's work was substantially modified by his successor, the master of the south side of the nave. Once again, the overall unity of the composition is deceptive; in spite of its profound balance and harmony, the façade is the result of a revision of the first design.[86] Its composite character is perhaps most visible in the gable over the north portal. But the plan from the outset envisioned a western mass in the tradition of St.-Denis, with bays that transform the double aisles to large square units underneath the towers.[87] The need to support the upper chambers and towers led to a structure massive in scale, fundamentally different in character from the thin, flattened surfaces of the nave to the east. The abaci, capitals, base profiles, and plinths suggest that the master of the second state of the west façade was the master of the upper stories of the south side of the nave, and that he came to the site when work was beginning on the south nave tribune.

The last bay of the nave, as has been seen, is anomalous

[78] Caviness (as in n. 61), 46-55.

[79] J. Henriet, "Le choeur de Saint-Mathurin de Larchant et Notre-Dame de Paris," *Bulletin monumental*, CXXXIV, 1976, 292-93 and 300. Larchant was a possession of the chapter of Notre-Dame.

[80] *Ibid.* Henriet points out, however, that the apse at St.-Mathurin was not complete at that date.

[81] The discovery of the relics is mentioned by Robert de Torigni (as in n. 15), II, 136. There are, however, some problems with his passage, as noted in *ibid.*, n. 1. The obituary of Notre-Dame states that Philip Augustus deposited the relics in the treasury of Notre-Dame (Guérard, IV, 110). See the discussion of the ensuing litigation with the abbey of St.-Denis in G. Spiegel, "The Cult of Saint Denis and Capetian Kingship," *Journal of Medieval History*, I, 1975, 48-50.

[82] Aubert, 1920, 138-39.

[83] The variation in the plinth heights from north to south in the façade structure suggests that, at least at the lower levels (plinths, bases, and lower courses of the pier structure), construction was sporadic. There is good evidence to support Aubert's contention (see his plan) that the intermediate supports are slightly later in date than the main piers defining the massive square bays.

[84] As noted in Mortet, 1903, 40.

[85] Sauerländer (as in n. 4), 1-55; also see Bony (as in n. 3), 239. This date may be a little late.

[86] To ascribe the differences between the west façade and the nave to a new master oversimplifies the complex process of construction here. See most notably Branner, 1962, 40-41, who believed that the master of the west façade had come from Chartres.

[87] *Ibid.*

in relation to the rest of the interior (Fig. 27). The supports consist of a pair of columns with a single attached shaft in the next to the last pair of supports, and columns with four attached shafts in the westernmost supports. While the responds in the next to last bay consist of detached shafts (P2 and Q2), as to the east, those above the westernmost nave supports are engaged (P1 and Q1), and substantially larger in diameter. Much has been made of the later date of these supports, their "experimental" nature, and their relation to the construction of Chartres Cathedral.[88] But their heavier dimensions reinforce the western bays of the nave against the massive construction of the western block. As noted above, the design of the bases indicates that the easternmost pair of supports was erected before the western (Fig. 21, e, f); at P2 construction reached at least to the departure of the shafts at the top of the impost, whereas the corresponding support on the south seems to have been left incomplete for some time at the level of the capital or below (Fig. 25, a). Work on these piers took place after much of the west face of the façade, up to the top of the portals, was in place (Fig. 26, a). The dimensions of the plinths, of the bases of the westernmost nave piers, and of the base profiles at the departure of the nave responds, indicate that these are all later in date than their counterparts to the east; they were erected after the lower walls of the entire west façade structure were essentially in place. At this stage, construction was moving from west to east, i.e., from the façade back to the interior.

Once the lower walls of the west façade and the western bays of the nave were begun, it is more difficult to set out a sequence of construction. A seam up the height of the wall between the western bay of the nave and the eastern piers of the west block reveals that the façade was constructed to the top of the rose level, which corresponds to the level of the vaults on the interior, before the nave upper walls in the westernmost bay were complete. Construction thus comprised the tower chambers and their vaults, as is indicated by the handling of bases and plinths in these chambers and the interior tribune in front of the rose, in which the organ is now situated. On the north side of the westernmost bay, the clerestory windows are slightly larger. As with the piers below, the tribune openings are thickened, and on the south the oculus in the tympanum of the tribune opening is suppressed. The shafts added to the columns below and the rejection of *en-délit* elements above are a result of the specific location of these supports; they respond to the need to stiffen and reinforce the elevation next to the west façade, and do not reflect the influence of Chartres or express a "dissatisfaction" with the simple cylindrical supports to the east.

The construction of the western block prior to the completion of the nave may have been a response to certain inherent difficulties in the construction of sexpartite vaults, as has recently been set forth by Mark and Taylor.[89] Details of the nave vaults (especially the bosses) indicate that those in the eastern two bays of the nave were erected before those in the western bays, even though the upper walls from the western crossing piers to point 3 were built to their full height (Fig. 26, b). Once completed, the upper walls of the second half-bay west of the façade mass functioned as a dead load to help counteract the thrusts exerted by the two vaulted bays to the east. The completion of these eastern bays long before the rest of the nave to the west indicates that this part of the structure could have been put into use long before the nave as a whole was finished.

The Dating of the Western Bays of the Nave and the Façade

It has been shown that work on the façade and perhaps one pair of supports in the westernmost bay (P2 and Q2) started while construction of the eastern three bays of the nave was in progress. The excavations of 1186 were perhaps preparatory to work on the west bay of the nave. As with the construction of some parts of the nave to the east, however, work here was sporadic. There was a major revision to the façade program by the third master at Notre-Dame, who thickened the entire structure towards the west sometime around 1195-1200. These changes to the façade, which may have occurred when construction was still only a few meters above ground level, greatly complicate an analysis of its construction.

The date of the façade sculpture need not be rigorously tied to the dates of the façade structure. The earliest phases of the sculptural decoration of the portals have been placed ca. 1200.[90] But some of the sculptural decoration could have been fitted into the portal cavities after work was finished on this part of the façade. This would have had the considerable advantage of protecting the sculpture from accidental damage by the continuing construction above it. As the west façade and the better part of westernmost nave bay were erected simultaneously, and both consisted of a far greater mass of masonry than the bays to the east, it is not surprising that the construction of the entire complex moved slowly. We must also take into account that the easternmost nave bays were vaulted during this period: Maurice de Sully's gift of lead for the roof in his will suggests this.

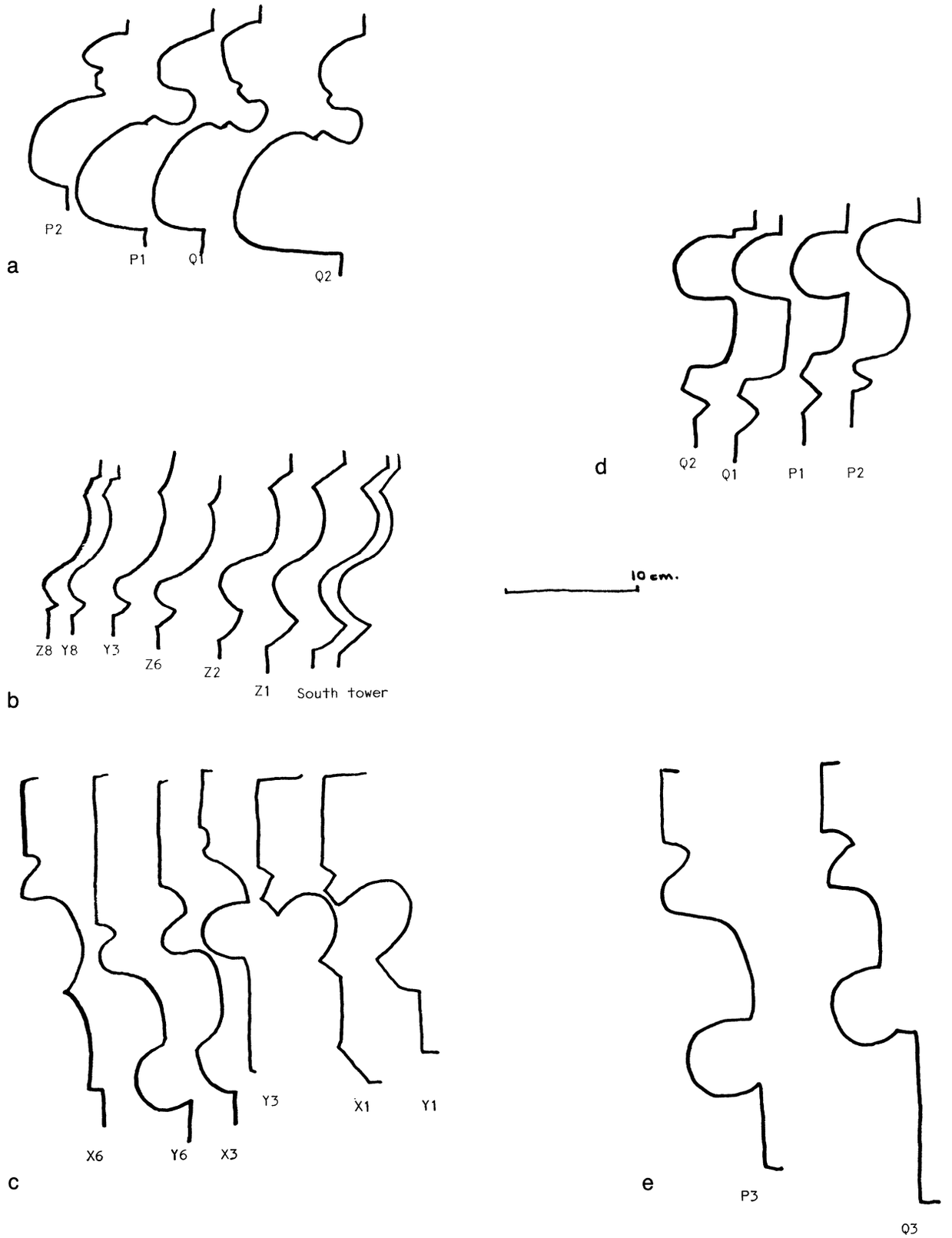
The most secure date for the façade is provided by the destruction in 1208 of several houses belonging to the Hôtel-Dieu located on the southeast corner of the *parvis*, the site where the south portal was to be constructed.[91] Construction of the façade may indeed have been delayed for a number of years while this was being negotiated; certainly, as already remarked, there is good evidence to tie the north side of the façade to a considerably earlier date, when eastern bays of the nave were still underway. This

[88] *Ibid.*

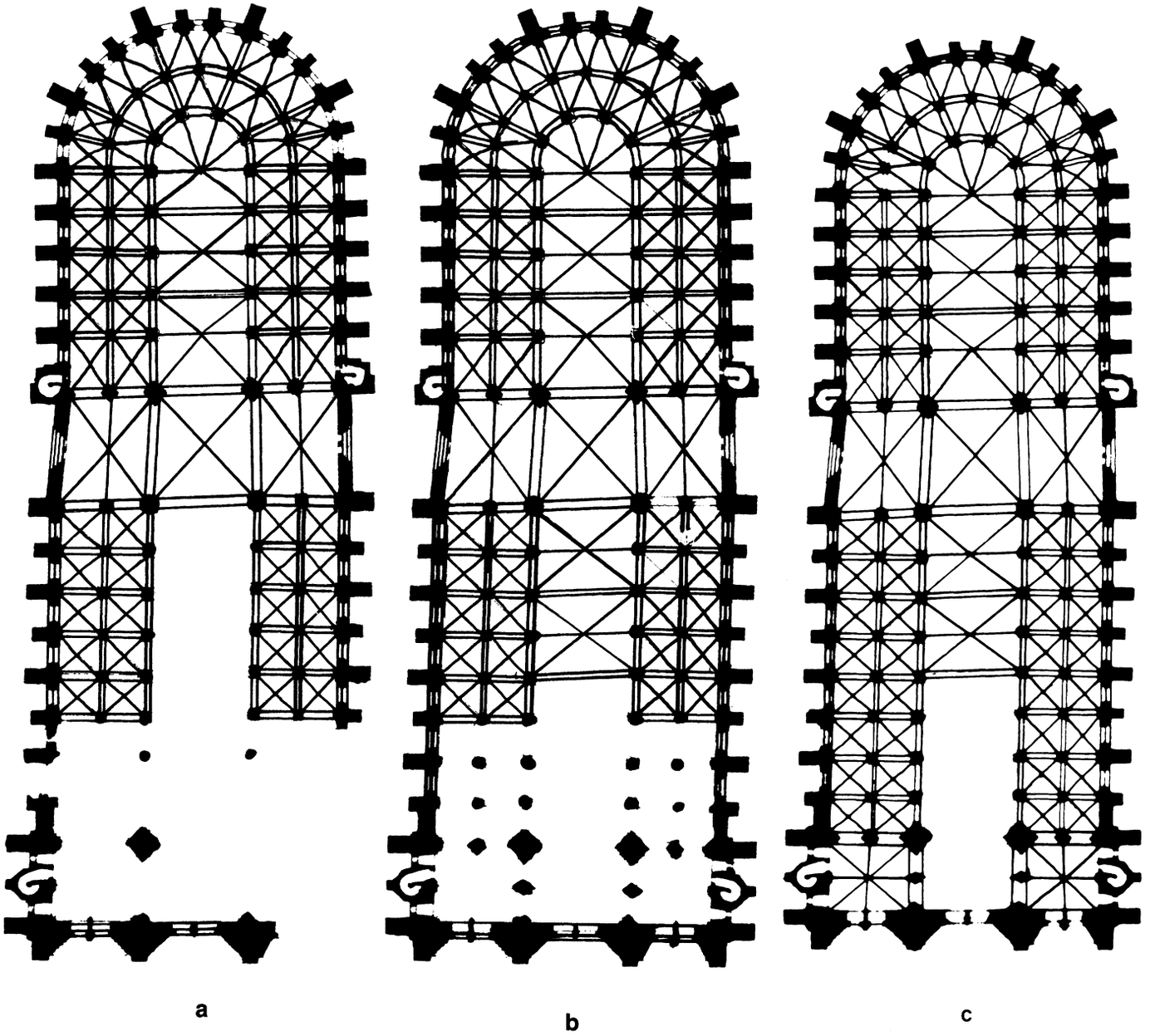
[89] William Taylor and Robert Mark, "The Technology of Transition: Sexpartite to Quadripartite Vaulting in High Gothic Architecture," *Art Bulletin*, LXIV, 1982, 579-87, esp. 582-83.

[90] W. Sauerländer, *Gothic Sculpture in France, 1140-1270*, London, 1972, 456-57.

[91] Mortet, 1888, 46, and Aubert, 1920, 34, n. 3.



25 Base, plinth, and abacus moldings: **a.** bases above westernmost nave supports on north and south; **b.** plinths in south tribune; **c.** abaci in tribune arcade, north and south; **d.** plinths above westernmost nave supports on north and south; **e.** abaci at departure of main vaults, north and south



26 Construction phases of the nave

interruption no doubt led to the change in design that was noted by Sauerländer.

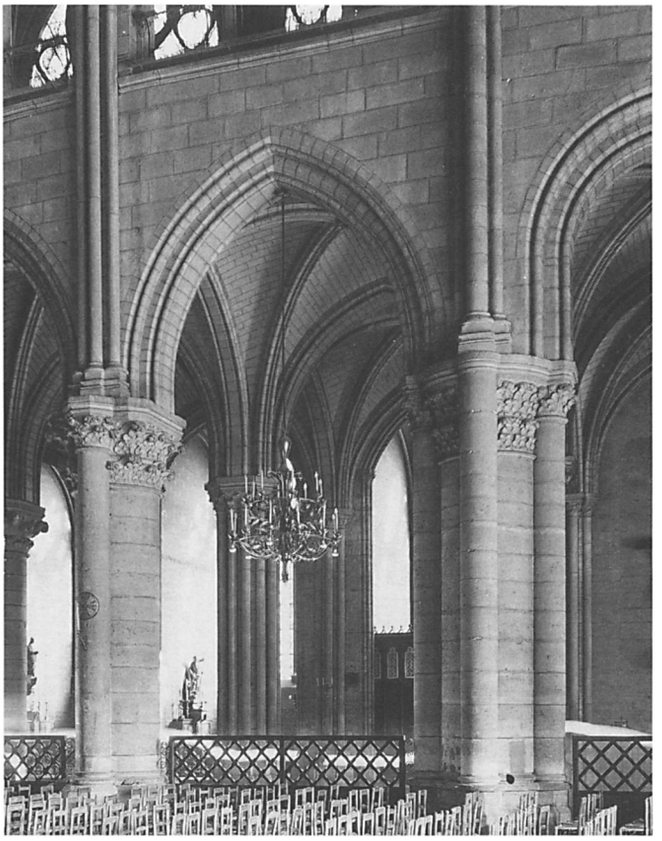
Donations to chaplaincies are precarious evidence at best for dating. Nonetheless, it is worth mentioning that the gift of a chaplaincy by Louis VIII and Blanche of Castille in 1218 for an altar in the outer aisle on the south side at S5-S6 suggests that by this date the aisles were complete and perhaps accessible through the portals of the west façade (Fig. 26, c).[92] By then the eastern bays of the nave were vaulted; much of the church was thus in use. As Aubert noted, the completion of this part of the church permitted a robber to conceal himself undetected for several days under the roof.[93]

The Upper Stories of the West Façade, and the Beginning of the Thirteenth-Century Modifications

The façade up to the top of the rose was built simultaneously with much of the nave. The open gallery above the rose, however, represents a completely separate and considerably later building campaign, revealing a new sensibility in every respect: its light, open, and delicate forms, typical of Rayonnant design, are nowhere anticipated in

[92] For the document, see Aubert, 1920, 139, n.1.; also see Kraus, 215, n. 1.

[93] Aubert, 1920, 34.



27 Westernmost supports of nave, south side (photo: Arch. Photo. Paris/S.P.A.D.E.M.)

the earlier parts of the structure. It is clear that there was a significant interruption of construction at the top of the rose while the vaults were installed in the western bays of the nave.[94] This interruption was perhaps prolonged, after the vaults were completed, by a fire in the upper parts of the building, and the reconstruction of the flying buttresses and the upper stories of the interior.[95] At about the same time, the first of the chapels inserted between the buttresses of the nave was constructed.[96] The introduction of bar tracery in the clerestory windows, and the identical treatment of details in the first nave chapel on the north side, suggest that this work took place under the direction of a new master, one who attempted to modernize the cathedral in the light of developments taking place at Reims Cathedral, for example.[97] The rebuilding of the upper stories can be seen as a "correction" of the original design, tending toward greater efficiency (and perhaps stability) of structure and greater luminosity in the interior.[98]

The construction of the west façade upper stories concentrated on the south tower chamber before the north: the shafts supporting the wall-rib continue to be cut as detached elements there (Fig. 28), and the base and plinth profiles are similar to those of the south tribune to the east (Fig. 25, b). Certain details, such as the portals giving access to the tribunes on north and south, are handled more simply on the south (Figs. 28 and 29). This is also true of the trilobed arcading at the top of the spiral stairs in each tower chamber. There is every possibility that the south tower chamber was built by the same master who erected the upper stories on the south side of the nave. The almost complete absence of detached elements on the north, however, indicates the presence of a new, fourth master builder on the scene. He would be the same master who completed the most western nave piers and the wall that rises above them.[99]

The south tower chamber thus antedates the north. But on the next story, that of the open gallery at the base of the towers, the north side was constructed before the south. The windows behind the arcading that open into the bell chambers, and certain parts of the arcading on the east and south faces of the north tower, are earlier in date than the corresponding elements on the south (Fig. 30).[100] In fact, each side of the gallery arcading on the east and south face of the north side seems to consist of experimental patterns. The simple unadorned window openings on the north are replaced by larger and heavily decorated openings on the south, the latter decorated by the crockets that reappear in abundance on the towers above (Fig. 30).

On the other hand, as Mortet pointed out, the south tower anticipates that on the north: the more elaborate design, the capitals *à bec*, and the greater proliferation of vertical crocket strips all indicate a later date on the north.[101] While the latter may be largely a response to the larger dimensions of the north tower, the setting of the impost at an angle is a refinement of the arrangement of this form on the south.

The explanation for this building chronology in the façade is probably the result of the positioning of the lifting

[94] Against this, see Branner, 1965, 27, who states that the upper gallery followed the west rose "at once." There is general agreement that the façade to the top of the rose was complete by ca. 1225 (Aubert, 1920, 50; Branner, 1965, 16), and I see no reason to disagree with that view. The Rayonnant gallery above the rose, however, is completely different in style and conception from what exists below, and must date to at least a decade later.

[95] Viollet-le-Duc, II, 292, associates the reconstruction of the clerestory and flyers with the fire, which he dates on the basis of the archaeological evidence of the remodeling to ca. 1230-40. In the absence of any vestiges of the fire after the 19th-century restorations, its extent cannot now be assessed. In any event, the remodeling of windows and flyers was probably completely independent of the fire. Viollet-le-Duc's date for this may be too late, as similarities to work at Reims may place the remodeling in the early to mid-1220s, as in Aubert, 1920, 149-50 and 158-65.

[96] See n. 4 above.

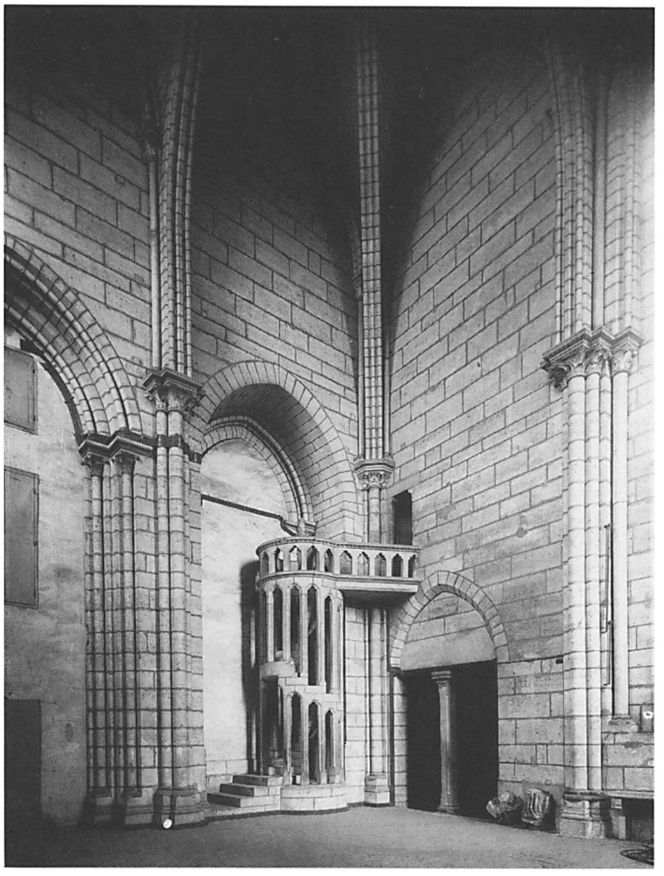
[97] Indeed, as noted by Branner, 1965, 15-16, the tracery pattern at Notre-Dame is directly related to that at Reims, and represents one of the earliest reflections of the invention of bar tracery at the Champenois cathedral.

[98] The remodeling of the windows and flyers was far more extensive than the damage caused by a fire would seem to have required; it was probably undertaken to make the as yet incomplete cathedral "up to date." See n. 95 above.

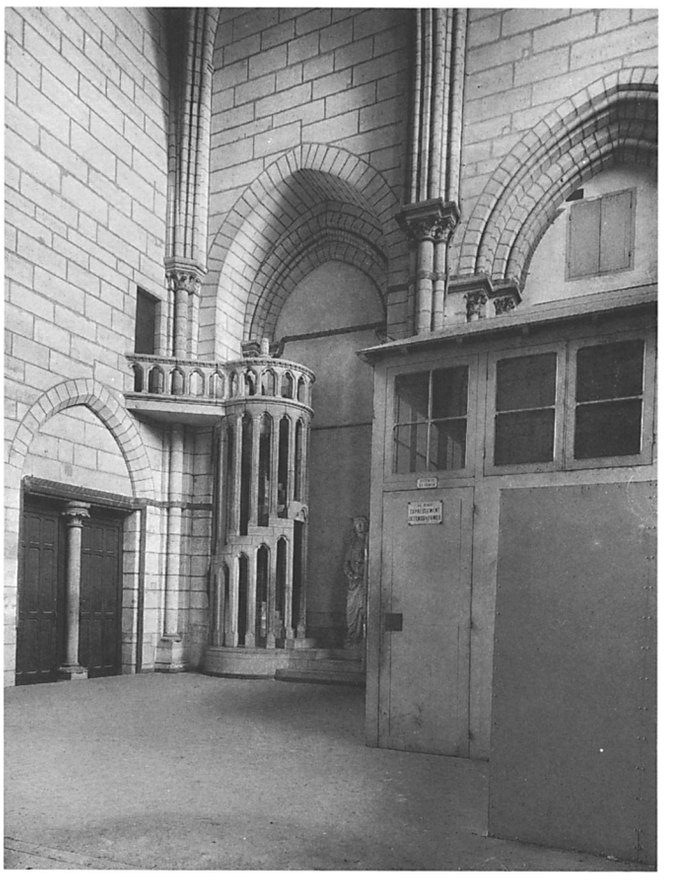
[99] This master had a taste for a heavy and more conservative wall structure, and it is he who introduces *tas-de-charge* construction in the most western nave vaults. See Branner's remarks on this, 1962, 41, though he does not there specify that it is the most western nave vaults, the last to be erected, that are constructed in this technique.

[100] In this view I differ with Mortet, 1903, 34-43, who believed that the entire north side of the upper levels was later in date than the south.

[101] Mortet, 1903, 39-41.



28 South tower chamber (photo: Arch. Photo. Paris/ S.P.A.D.E.M.)



29 North tower chamber (photo: Arch. Photo. Paris/ S.P.A.D.E.M.)

devices. Work always stepped up to the next level on the same side that was most recently under construction and then construction moved horizontally across the façade (Fig. 31). With the exception of the interruption of work between the top of the rose level and the open gallery at the base of the towers, this does not imply a sequence of separate campaigns: the work simply concentrated on one side before the other, and was conceived as a series of horizontal layers.

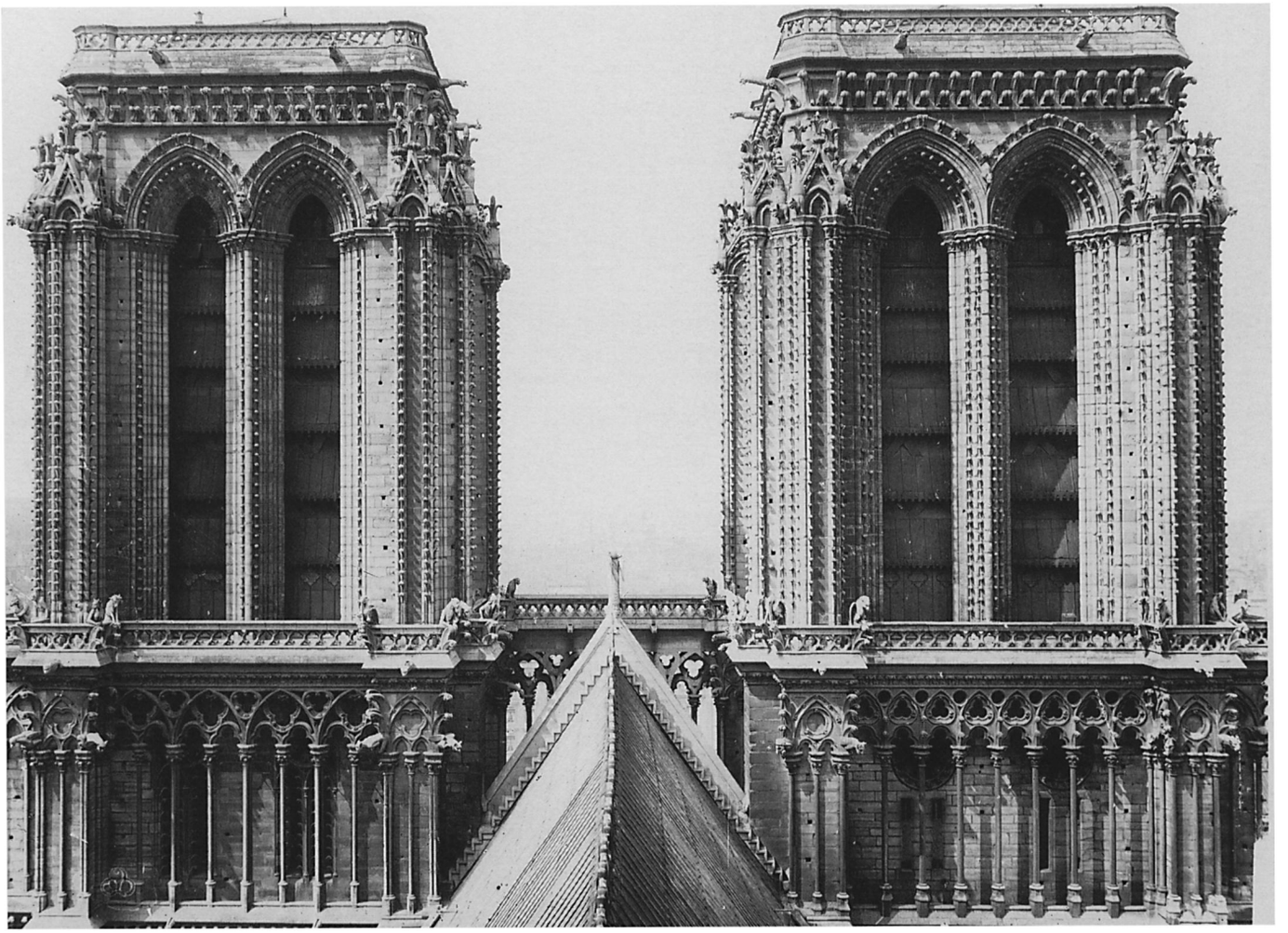
The open gallery above the rose level anticipates a number of elements in the design of the north transept façade by Jean de Chelles in ca. 1250. Yet the gallery is fuller, rounder, and heavier. The style of the gallery and that of the towers is clearly later than that of the remodeled clerestory windows of ca. 1225. It can therefore be assumed that construction of the uppermost parts of the façade took place only once the work on the remodeling of the interior was complete. The gallery can therefore be dated to ca. 1235-40, though its almost complete rebuilding in successive restorations precludes more exact conclusions. The towers followed in the next five years, 1240-45.[102]

Conclusions

The construction of Notre-Dame in Paris proceeded with great rapidity. There were no significant interruptions, and large numbers of masons and sculptors were employed at the site, occasionally with a remarkable continuity among different parts of the building. At the same time, there is the distinct possibility that, at least on one occasion, two independent groups of masons worked simultaneously on different sides of the church. Furthermore, as has been seen, the nave was well underway while work was still in progress in the choir, and later the façade was begun while construction was in progress on the nave. To speak of "campaigns" under these circumstances would be incorrect, for there are rarely either chronological or stylistic criteria that separate one phase of construction from the next. Notre-Dame is not a building in which there are significant interruptions in construction and dramatic changes in design from one part to the other, as can be seen in the Cathedral of Beauvais, for example.[103] There are, nonetheless, a series of structural, technical, and aesthetic modifications of a subtle nature that are evidence of a process of continuous

[102] Aubert, 1920, 35 and 48, cites a document of 1245 in which women are forbidden to spend the night in the towers. The bells for the south tower were given by Bishop William of Auvergne, 1228-49.

[103] On Beauvais, see Stephen Murray, "The Choir of the Church of St.-Pierre, Cathedral of Beauvais: A Study of Gothic Architecture Planning and Construction Chronology in Its Historical Context," *Art Bulletin*, LXII, 1980, 533-51. At Beauvais the interruption of construction led to a fundamental change in design between the original conception of the first master and his successor; no such fundamental shifts appear in the Cathedral of Paris.



30 West towers from east (photo: Arch. Photo. Paris/S.P.A.D.E.M.)

reflection on the character of the elevation. The only serious interruption of construction occurred when work reached the top of the rose window in the west façade. This interruption, initially for the completion of the nave vaults, was prolonged by the remodeling of the upper walls and flying buttresses throughout the church. During this period, the first of the nave chapels was also inserted between the buttresses on the north side.

A thorough examination of the monument, especially the upper stories, reveals that the erection of the walls and certain details evolved in favor of increasingly efficient and at times more economical methods of construction: it could even be argued that the extreme reduction in the thickness of the nave walls might have been part of this process. Certain parts of the building, especially on the north side of the nave, were simplified to streamline construction. On the other hand, the energy and rapidity with which construction was pursued, the modifications made to the structure before the façade was completed, and the immediate remodeling of the transept terminals attest to the extraordinary wealth of the cathedral.[104]

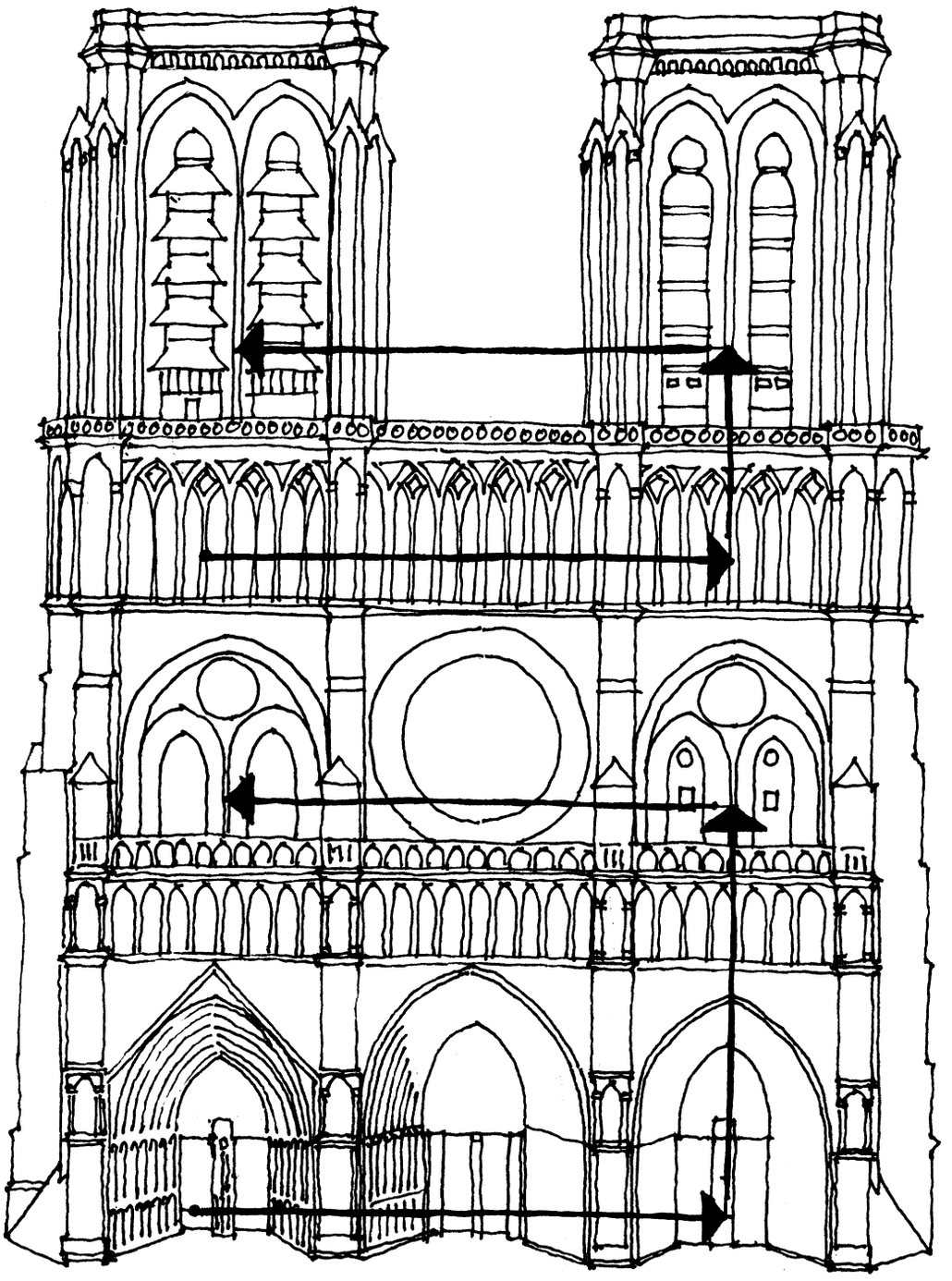
Kimpel and Suckale have recently suggested that the cathedral could only have been constructed with patronage from the royal family.[105] In the absence of documents specifying any large gifts to the cathedral fabric,[106] this suggestion can only remain hypothetical. We do know, however, that both Louis VII and Philip Augustus expressed their special affection for this church. The sculpture of the Ste.-Anne portal and the innovation of a gallery of kings in the west façade may reflect royal patronage; in any event, it is certain that these features proclaim the special relationship beween the cathedral and the monarchy.[107] The similarities between the original choir elevation of Notre-Dame in Paris and the elevation of Senlis raise the question of whether we are not concerned here with a specifically Capetian idiom.

[104] For the finances of the cathedral, see Henry Kraus, *Gold was the Mortar,* London, 1979, 17-38; and Kimpel and Suckale, 148-49. Also see Boussard (as in n. 1), 228-29 and 291-93.

[105] Kimpel and Suckale, 149.

[106] Kraus, 215.

[107] See Horste (as in n. 4), esp. 204-10. On the gallery of kings, see the recent catalogues published in connection with the rediscovery of the heads in 1977, for example, C. Gomez-Moreno, *Sculpture from Notre-Dame, Paris: A Dramatic Discovery,* New York, 1975.



31 Construction sequence of west façade (drawing by Warren Wilson)

The nave was designed from the outset with the premise of flying buttresses as an inherent part of the design. This accords with their first appearance in the late 1160s or early 1170s in other monuments. We can suppose, then, that the second master of Notre-Dame fully understood the implications of flying buttresses and designed the nave accordingly. This took place simultaneously with or shortly after their probable incorporation into the continuing work on the choir.

It is possible to isolate the identities of at least five master masons prior to Jean de Chelles.[108] The first master established the plan and set out the lower story of the choir. He may perhaps have been the Richard *cementarius* cited in the document of 1164. He was replaced when work was in progress on the choir tribunes by a second master, who completed the choir and at the same time started the nave. The second master completed the arcade level and the full height of the nave elevation on the north side in the eastern

[108] See n. 12 above.

three bays. He also initiated work on the north side of the west façade. We can imagine that this master was in office from roughly 1170 to 1190. Changes in overall design and in architectural detail in the Tribune and upper stories of the south nave wall indicate that a third master intervened at this point. The third master thickened the structure of the west façade. He used his own templates for the tribune and main vault departure abaci, incorporated oculi in the tribune arcading, and introduced the rampant outer vault segments in the south tribune. He seems to have been at the site from ca. 1190 to ca. 1220, and his work included the construction of the south tower chamber and part of the organ gallery in front of the rose. The north tower chamber, and the completion of the most western nave bay, were undertaken by a fourth master, who brought the construction to the top of the rose and vaulted the western bays of the nave. This individual, whose work is more massive and ponderous than that of his predecessors, may have been in office only until ca. 1225-1230. The remodeling of the flyers and clerestory was the work of his successor, the fifth master, whose adept use of bar tracery indicates a familiarity with the work at Reims Cathedral. He presumably also supervised the insertion of the first chapels along the north side of the nave. It is probably also this master, who, elaborating on tracery patterns as they emerged in the ongoing reconstruction at nearby St.-Denis (begun in 1231), built the upper gallery and towers of the west façade. He began his work here on the east and south faces of the north tower, and resolved his pattern into the light and lacy arcading that one now sees on the west face and around the south tower. He would have been replaced in the late 1240s by the first securely named master of Notre-Dame, Jean de Chelles.[109] The transept terminals, subsequently reconstructed by Jean de Chelles and then Pierre de Montreuil, are among the great masterpieces of Rayonnant design, fitting conclusions to the masterpiece of Early Gothic in the rest of the church. But the new transepts also attest to the *morbus aedificandi*[110] that afflicted the canons and perhaps some of the bishops of this cathedral from the outset. No monument was more ambitious in scale than Notre-Dame when work commenced in ca. 1160, and no monument was more remodeled and revised as work progressed over the next sixty to seventy years.

Author of Cistercian High Gothic: The Abbey Church of Longpont . . . *(in* Analecta cisterciensia, xxv, *1979) and* The Thirteenth-Century Church at St.-Denis *(1985), in addition to various articles on Gothic architecture, Caroline Bruzelius currently is engaged in research on the Angevin churches of southern Italy and Naples, and the Brummer Collection of medieval sculpture in the Duke University Museum of Art. [Department of Art and Art History, East Duke Building, Duke University, Durham, NC 27708]*

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[109] Kimpel, *passim*.

[110] Victor Mortet, "Hughes de Fouilloi, Pierre le Chantre, Alexandre Neckam et les critiques dirigées au douzième siècle contre le luxe des constructions," *Mélanges d'histoire offerts à Charles Bémont*, Paris, 1913, 118.